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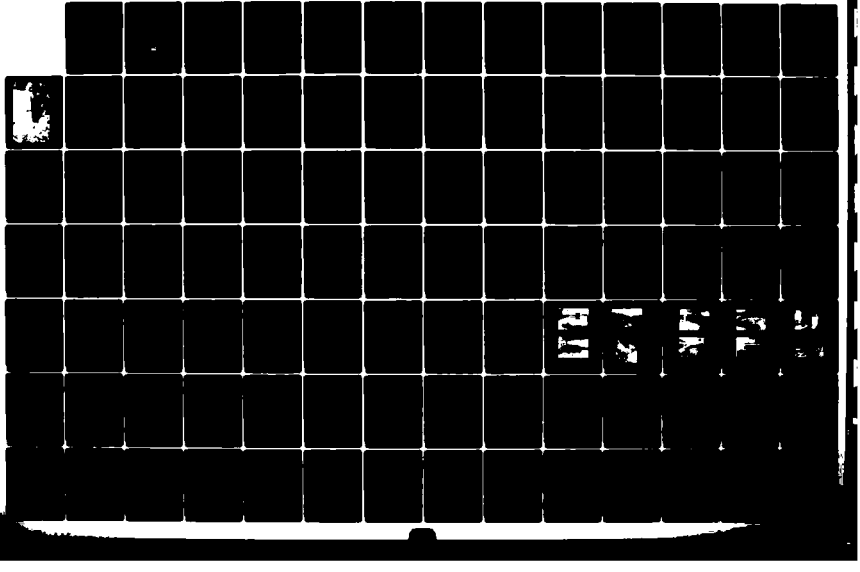

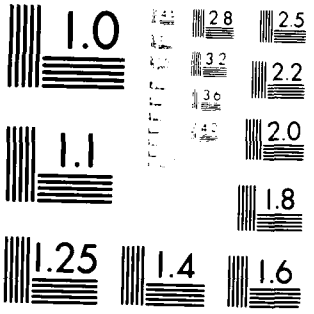

MICROCOPY RESOLUTION TEST CHART

AD-A143 838

NAUGATUCK RIVER BASIN

BEACON FALLS, CONNECTICUT

SEYMOUR RESERVOIR NO.1 DAM
CT 00358

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DTIC FILE COPY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: CT 00358	2. GOVT ACCESSION NO.: A143838
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): Seymour Reservoir No.1 Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS	5. TYPE OF REPORT & PERIOD COVERED: INSPECTION REPORT
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254	12. REPORT DATE: February 1980 13. NUMBER OF PAGES: 65
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
Naugatuck River Basin
Beacon Falls, Connecticut

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Seymour Reservoir No.1 Dam consists of an earth embankment with a stone masonry core wall. The dam has an overall length of 340 feet including spillway; a top width of 10 feet; and a maximum height of 26 feet. Based on visual inspection and a review of all pertinent data, the condition of the dam is judged to be fair. The dam is classified as "Small" in size, with a "Significant" hazard potential. A test flood equal to ½ PMF was selected.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

Inclosed is a copy of the Seymour Reservoir No. 1 Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, The Bridgeport Hydraulic Company, 835 Main Street, Bridgeport, Connecticut 06609.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

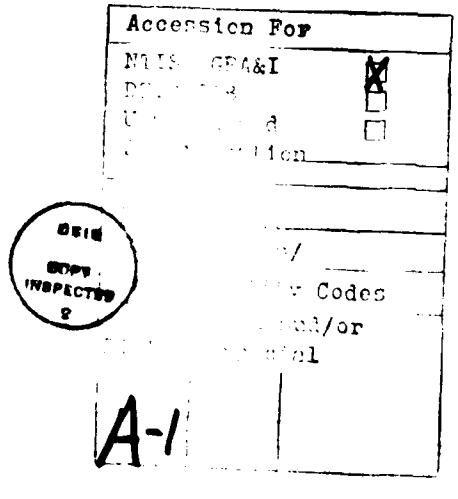
Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

SEYMOUR RESERVOIR NO. 1 DAM
CT 00358

NAUGATUCK RIVER BASIN
BEACON FALLS, CONNECTICUT



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

49-09

FEBRUARY 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

IDENTIFICATION NO: CT 00358

NAME OF DAM: Seymour Reservoir No. 1 Dam

TOWN: Beacon Falls

COUNTY AND STATE: New Haven County, Connecticut

STREAM: Tributary to Hemp Swamp Brook

DATE OF INSPECTION: November 28, 1979

BRIEF ASSESSMENT

The Seymour Reservoir No. 1 Dam consists of an earth embankment with a stone masonry core wall. The dam has an overall length of 340 feet including spillway; a top width of 10 feet; and a maximum height of 26 feet. The overflow spillway consists of a 23-foot concrete weir with stone masonry training walls. The outlet works consist of two 12-inch cast iron pipes through the earth embankment and core wall of the dam, controlled by manually operated gates in an upstream gate house.

The dam impounds Seymour No. 1 Reservoir, a distributing reservoir for public water supply for the Valley Division of the Bridgeport Hydraulic Company.

Based on the visual inspection and a review of all pertinent data, the condition of the dam is judged to be fair. Features that can affect the integrity of the dam are the deterioration of the spillway weir, the seepage exiting at the toe and downstream of the dam, and inadequate spillway capacity.

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the dam is classified as "Small" in size, with a "Significant" hazard potential. A Test Flood equal to one-

half the Probable Maximum Flood (1/2 PMF) was selected in accordance with the Corps of Engineers' Guidelines. Due to the small size of the impoundment, the Test Flood outflow was assumed to equal the Test Flood inflow of 625 cfs and would overtop the low point of the dam crest by 0.9 feet.

The spillway capacity with the water level at the low point of the dam crest is equal to 105 cfs or 17 percent of the Test Flood.

It is recommended that a qualified, registered engineer perform a detailed hydrologic and hydraulic analysis to determine the need for and means to provide additional discharge capacity; to investigate the significance of the seepage downstream of the dam and design control measures as necessary; to design repairs to the spillway weir; and to perform annual technical inspections of the dam. An operations and maintenance manual should be prepared, and a formal warning system should be put into effect.

The owner should implement these recommendations as described herein and in greater detail in Section 7 of the Report, within one year after receipt of this Phase I Inspection Report.

ROALD HAESTAD, INC.

Donald L. Smith, P.E.
Project Engineer

Roald Haestad
President

This Phase I Inspection Report on Seymour Reservoir No. 1 Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the

condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety of the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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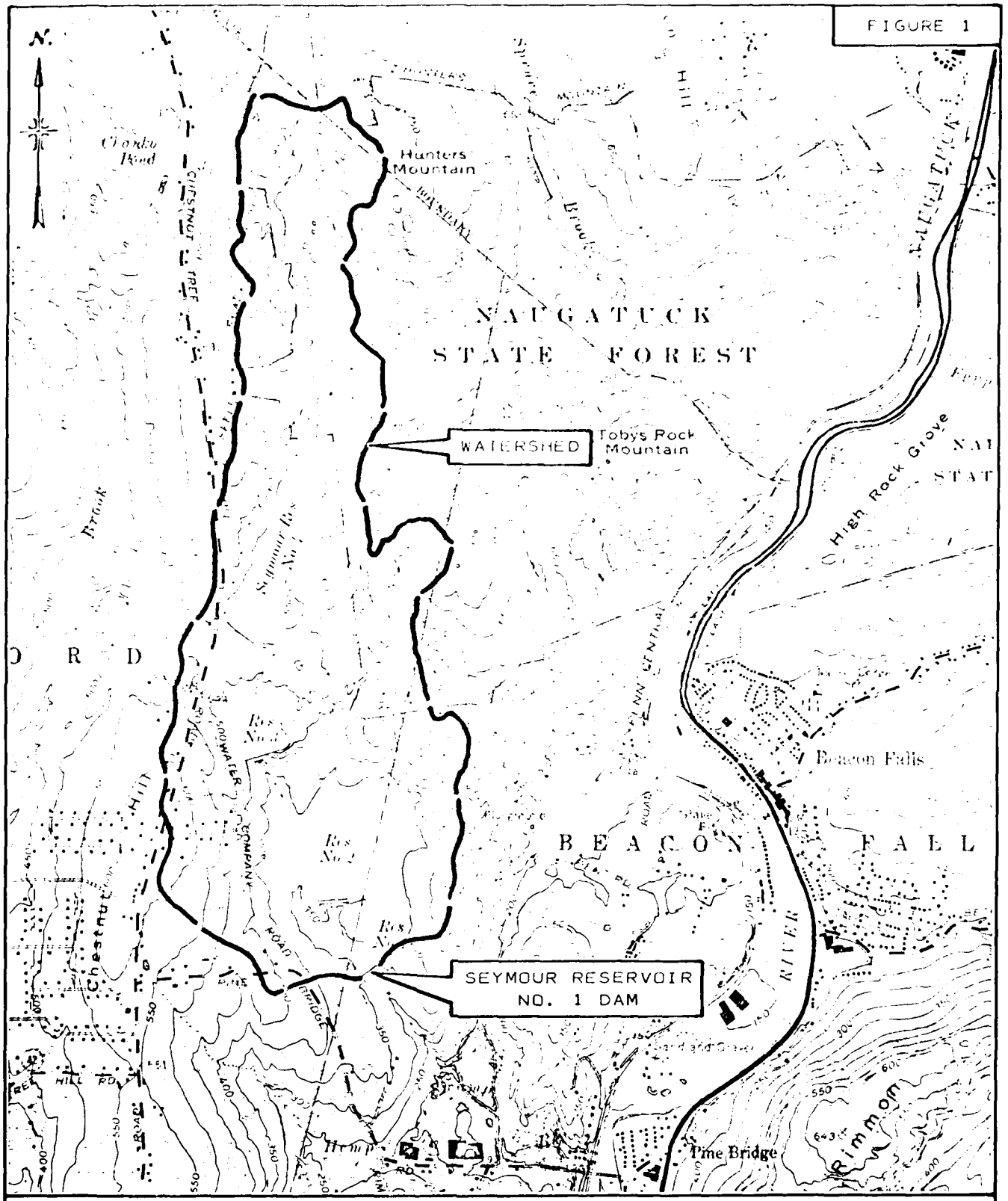
U.S. ARMY ENGINEER DIV NEW ENGLAND [illegible] ENGINEERS WALTHAM, MASSACHUSETTS HOWARD HAESTAD, INC. CONSULTING ENGINEERS [illegible]	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	SEYMOUR RESERVOIR NO. 1 DAM - CT 00358 TRIBUTARY TO BEAVER SWAMP BROOK BEACON FALLS, CONNECTICUT DATE: 12 DEC '79



LOCATION PLAN

SEYMOUR RESERVOIR NO. 1 DAM
BEACON FALLS, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC. NAUGATUCK QUADRANGLE 1972

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

PROJECT INFORMATION
SECTION 1

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Roald Haestad, Inc., has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Roald Haestad, Inc. under a letter of November 1, 1979, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0015 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The Purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to indentify conditions requiring correction in a timely manner by non-federal interest.
2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The dam is located immediately downstream of Seymour Reservoir No. 2 Dam, on an unnamed tributary to Hemp Swamp Brook in the Town of Beacon Falls, Connecticut. The dam is shown on the Naugatuck Quadrangle Map having coordinates of latitude N 41° 26.1' and longitude W 73° 05.1'.

b. Description of Dam and Appurtenances

The dam consists of an earth embankment with a stone masonry core wall. The earth embankment has a top width of 10 feet, a maximum height of 26 feet, an upstream slope of 2 horizontal to 1 vertical, and a downstream slope of 1.7 horizontal to 1 vertical. The upstream slope is protected by a layer of riprap, while the downstream slope is grass covered. Drawings indicate that the core wall extends from approximately 5 feet below the original ground surface to within 2 feet of the top of the dam. The core wall has a top width of 2 feet and a batter of approximately 1 horizontal to 24 vertical on both the upstream and downstream faces. The overall length of the dam is 340 feet including a 23 foot wide overflow spillway located at the right end of the dam. The spillway was originally constructed of stone masonry, but has since been rebuilt by replacing the stone masonry weir with a concrete weir. A steel beam bridge with a wood deck spans the spillway. The outlet works located near the center of the dam consist of two 12-inch cast iron pipes through the earth embankment and core wall of the dam, controlled by manually operated gates located in an upstream gate house. One of the 12-inch cast iron

pipes is the supply main which transports water from the reservoir to a downstream treatment plant and the other is the low level outlet or blowoff which outlets downstream of the toe of the dam.

c. Size Classification - "Small"

According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, a dam is classified as "Small" in size if the height is between 25 feet and 40 feet, or the dam impounds between 50 Acre-Feet and 1,000 Acre-Feet. The dam has a maximum height of 26 feet and a maximum storage capacity of 49 Acre-Feet. Therefore, the dam is classified as "Small" in size.

d. Hazard Classification - "Significant"

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the hazard classification for the dam is "Significant". A dam failure analysis indicates that four (4) houses located downstream of the dam would be effected in the event of a dam breach, possibly resulting in the loss of a few lives.

The depth of flow in the stream in the area of the houses prior to dam breach is 1.3 feet, based on the maximum spillway capacity of 105 cfs. The peak flow in this area due to the dam breach is 3,500 cfs, equivalent to a depth of flow of 6.4 feet or approximately 1 foot below the sill elevation of the four houses.

e. Ownership

Former Owner: The Seymour Water Company

Present Owner: The Bridgeport Hydraulic Company
835 Main Street
Bridgeport, Connecticut 06609
(203) 367-6621

f. Operator: George Smith, Manager
Valley Division
Bridgeport Hydraulic Company
70 New Haven Road
Seymour, Connecticut 06483
(203) 888-4511

g. Purpose of Dam

The dam impounds Seymour Reservoir No. 1, a distributing reservoir for public water supply for the Valley Division of the Bridgeport Hydraulic Company.

h. Design and Construction History

It is believed that the dam was constructed in 1898, as designed by William G. Smith, Civil Engineer, *Waterbury, Connecticut*. A bridge was constructed over the spillway at an unknown date. The original stone masonry weir was replaced around 1960 with a concrete weir. The blowoff was extended and a new gate installed on the line at an unknown date.

i. Normal Operational Procedures

Seymour Reservoir No. 1 is a distributing reservoir for public water supply. Intake gates in the gate house and on the supply main are normally left open as water is continuously drawn for treatment and distribution. The low level outlet is normally operated once a month during the summer to maintain the water quality. The water level is maintained essentially constant by regulating the flow from three upstream reservoirs. The water level in the reservoir is recorded daily.

1.3 Pertinent Data

a. Drainage Area

The drainage area consists of 1.4 square miles of rolling, wooded terrain, the majority of which is either State Forest or owned by the Bridgeport Hydraulic Company.

b. Discharge at Damsite

The discharge at the damsite is over a 23 foot long concrete and stone masonry overflow spillway. Outlet works consist of a 12-inch diameter cast iron blowoff and a 12-inch diameter cast iron supply main, both controlled by manually operated gates in an upstream gate house. The supply main normally discharges to a downstream treatment plant.

1.	Outlet Works (conduits) Size:	12-inch blowoff 12-inch supply main
	Invert Elevation at Gate House:	315.0 blowoff 319.0 supply main
	Discharge Capacity:	12 cfs (blowoff)
2.	Maximum Known Flood at Damsite:	Unknown
3.	Ungated Spillway Capacity: at Top of Dam: Elevation:	 105 cfs* 338.8**
4.	Ungated Spillway Capacity: at Test Flood Elevation: Elevation:	 220 cfs 339.7
5.	Gated Spillway Capacity at Normal Pool Elevation: Elevation:	 N/A N/A
6.	Gated Spillway Capacity at Test Flood Elevation: Elevation:	 N/A N/A
7.	Total Spillway Capacity at Test Flood Elevation: Elevation:	 220 cfs 339.7
8.	Total Project Discharge at Top of Dam: Elevation:	 105 cfs* 338.8**
9.	Total Project Discharge at Test Flood Elevation: Elevation:	 625 cfs 339.7

*Capacity without Flashboards
**Low point in crest

c. Elevation - Feet Above NGVD (formerly MSL Datum of 1929)

1. Streambed at Toe of Dam:	313
2. Bottom of Cutoff:	308
3. Maximum Tailwater:	N/A
4. Recreation Pool:	N/A
5. Full Flood Control Pool:	N/A
6. Spillway Crest:	337.0
7. Design Surcharge - Original Design:	Unknown
8. Top of Dam:	339.0
9. Test Flood Surcharge:	339.7

d. Reservoir - Length in Feet

1. Normal Pool:	1,100 ft.
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	1,100 ft.
4. Top of Dam:	1,100 ft.
5. Test Flood Pool:	1,100 ft.

e. Storage - Acre-feet

1. Normal Pool:	39 Ac.-Ft.
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	39 Ac.-Ft.
4. Top of Dam:	49 Ac.-Ft.
5. Test Flood Pool:	56 Ac.-Ft.

f. Reservoir Surface - Acres

1. Normal Pool:	5 Acres
2. Flood-Control Pool:	N/A
3. Spillway Crest:	5 Acres
4. Test Flood Pool:	7.5 Acres
5. Top of Dam:	7 Acres

g. Dam

1.	Type:	Earth embankment with stone masonry core wall
2.	Length:	340 ft.
3.	Height:	26 ft.
4.	Top Width:	10 ft.
5.	Side Slopes:	1.7 Hor. to 1 Ver. downstream 2.0 Hor. to 1 Ver. upstream
6.	Zoning:	Unknown
7.	Impervious Core:	Stone masonry core wall 2 feet wide at top, with batter of 1 horiz. to 24 vert. on each face
8.	Cutoff:	Stone masonry core wall extends 5 ft. below natural ground surface
9.	Grout Curtain:	N/A
10.	Other:	

h. Diversion and Regulating Tunnel

1.	Type:	N/A
2.	Length:	N/A
3.	Closure:	N/A
4.	Access:	N/A
5.	Regulating Facilities:	N/A

i. Spillway

1.	Type:	Concrete and stone masonry overflow
2.	Length of Weir:	23 ft.
3.	Crest Elevation with Flashboards: without Flashboards:	 337.5 337.0 (5.6' long slot)
4.	Gates:	N/A
5.	Upstream Channel:	N/A
6.	Downstream Channel:	Boulders and gravel
7.	General:	The weir has a slot 5.6' long at elev. 337.0. Flashboards are normally in place to bring it to crest elevation (337.5).

j. Regulating Outlets

1.	Invert:	315.0 at gate house
2.	Size:	12-inch
3.	Description:	Blowoff or low level outlet. Cast iron pipe through earth embankment & masonry core wall. Originates at upstream gate house. Capacity - 12 cfs
4.	Control Mechanism:	Controlled by manually operated gates in upstream gate house.
5.	Other:	12-inch supply main discharges to a downstream treatment plant. Invert elevation 319.0 at gate house.

ENGINEERING DATA
SECTION 2

2.1 Design Data

Design data for the dam consisted of a drawing which contained a plan and sections of the spillway, a profile on the centerline of the dam, and a section through the dam and gate house. The dam is believed to have been designed by William G. Smith, Civil Engineer, Waterbury, Connecticut, in 1898.

2.2 Construction Data

The dam is believed to have been constructed around 1898. No information other than the above noted drawings was available on the construction of the dam, the spillway repairs, the construction of the service bridge over the spillway, extension of the blowoff or the installation of downstream drainage. Verbal information furnished by Bridgeport Hydraulic Company personnel indicated that the stone masonry weir was replaced around 1960 with a new concrete weir constructed on the remains of the stone masonry weir. It was also indicated that the blowoff pipe was extended and a downstream gate installed on the line at an unknown date. Crushed stone and drain pipes were installed at the same time to control water during construction. No plans are known to exist for these repairs.

2.3 Operation Data

Daily records of the reservoir level are maintained.

2.4 Evaluation of Data

a. Availability

Existing data was provided by the Bridgeport Hydraulic Company. A list of available reference material is given in Appendix B.

b. Adequacy

The information that was available along with the visual inspection, past performance history, and hydraulic and hydrologic calculations were adequate to assess the condition of the facility.

c. Validity

Field inspections and surveys indicate that the dam was constructed substantially as shown on the plans. The stone masonry spillway weir shown on the plans has been replaced with a concrete weir, and a bridge has been constructed over the spillway.

VISUAL INSPECTION

SECTION 3

3.1 Findings

a. General

The visual inspection of the dam was conducted on November 28, 1979. At the time of the inspection the water level was 0.3 feet below the top of the flashboards and 0.2 feet above spillway crest. The general condition of the dam at the time of inspection was fair.

The dam is an earth embankment with a stone masonry and concrete spillway at the right end, and outlet works near the center consisting of two 12-inch cast iron pipes through the dam to an upstream gate house.

b. Dam

The upstream slope of the dam is covered with riprap that is in good condition, Photo 1. The crest is partially paved and appears to be somewhat irregular in elevation with maximum differences of about 0.4 feet, as obtained from surveys made for this Phase I inspection. The downstream slope is grass covered, Photo 2, and it has a somewhat uneven surface, apparently as a result of minor sloughing. No seepage was observed out of the downstream slope. Seepage was observed at the toe and in an area downstream of the toe in the general vicinity of the downstream valves for the outlet pipes, Photo 3. The area to the right of the seeps appears to be drained by an asbestos cement pipe, discharging approximately 2 gallons per minute, Photo 4. Water from the seepage flows toward the right and then seeps into the ground,

possibly into a drainage blanket connected to the drain pipe. Seepage was also observed at the toe near the left abutment. The water flowing away from the dam can be seen in Photo 5. One large tree was observed growing on the right downstream slope of the embankment.

c. Appurtenant Structures

Spillway and Service Bridge

The spillway, located at the right end of the dam, has a concrete weir and stone masonry training walls. The concrete weir is in poor condition and water seeps through the base of the weir, Photos 6 and 7. The stone masonry training walls are generally in good condition with some stones missing near the base of the walls, Photo 6.

A service bridge over the spillway provides access to the downstream treatment plant. The concrete abutments were constructed over and adjacent to the original stone masonry training walls. The bridge appears to be in good condition, Photo 8. The steel beams have recently been painted and a new wood deck installed.

Gate House and Service Bridge

The gate house is constructed of brick above the water line and stone masonry and concrete below the water line, Photo 9. Several cracks in the brickwork were observed. No gates were operated and the chamber was not drained. The owner reported that the gates are operable.

The service bridge to the gate house appears to be in good condition. The wood deck looks new, and the steel has been recently painted.

d. Reservoir Area

The edge of the reservoir area is thickly wooded. evidence of slope instability was observed in the vicinity o the dam.

e. Downstream Channel

The spillway discharge channel was constructed at t right abutment with a low retaining wall forming the channel the left, Photo 10. The channel bottom is covered with boul and gravel, with some bushes growing between the boulders.

3.2 Evaluation

On the basis of the visual inspection, the dam is judge be in fair conditon. The following observed features could the future integrity of the dam:

a) The deterioration of the spillway weir could le its failure and subsequent erosion of its found and undermining of the training walls.

b) The seepage observed downstream of the dam does present an immediate safety concern; however, lead to piping and erosion in the future.

c) The presence of bushes in the spillway dischar obstructs flow and decreases the capacity of t

d) The root system of the tree on the downstream could in the future provide channels for the d of internal erosion. Toppling of the tree dur storm could cause damage to the embankment.

OPERATIONAL AND MAINTENANCE PROCEDURES

SECTION 4

4.1 Operational Procedures

a. General

The water level in the reservoir is essentially maintained constant by regulating the flow from three upstream reservoirs. The supply main intake gates are normally left open as water is continually drawn from the reservoir for treatment and distribution. The water level in the reservoir is recorded daily. The blowoff is usually operated once a month during the summer to maintain water quality. An inspection of the dam was made by Philip W. Genovese and Associates, Inc. in January 1979.

b. Description of Any Warning System In Effect

The dam is monitored during periods of heavy rainfall and if an emergency arose, steps would be taken to notify the downstream residents.

4.2 Maintenance Procedures

a. General

Normal maintenance procedures consist of mowing the grass on the downstream slopes and regrading or repaving the top of the dam. Necessary repairs are also made as required, as is evident by the recent work done on the service bridges.

b. Operating Facilities

No formal maintenance procedures exist for the operating facilities.

4.3 Evaluation

Present operations and maintenance procedures are satisfactory and should remain in effect. The current practice of having the dam inspected by a qualified, registered engineer should continue, with the inspections being made annually. An operation and maintenance manual should be prepared for the dam and operating facilities.

The warning system which is currently in effect should be formalized and should include monitoring of the dam during extremely heavy rains, and procedures for notifying downstream authorities in the event of an emergency.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

SECTION 5

5.1 General

Seymour Reservoir No. 1 Dam is the fourth in a series of four reservoirs (See Figure 1, page xi). The dam has a tributary watershed of 1.4 square miles of wooded, rolling terrain. The watershed is essentially undeveloped, with most of it owned by the Bridgeport Hydraulic Company or designated as State Forest. The original spillway was constructed of stone masonry. A concrete weir and bridge abutments were constructed at a later date on the original stone masonry. A 5.6 foot long by 0.5 foot deep slot in the center of the spillway contained flashboards at the time of inspection. The left concrete bridge abutment reduces the size of the spillway length by 1.3 feet, leaving an unobstructed length of 23 feet.

The spillway bridge has a height of 3.6 feet above the spillway level.*

The crest of the dam is uneven, with a low point 1.8 feet above the spillway level. The dam crest rises toward the right side to meet the spillway bridge. The crest has been partially paved. The spillway without flashboards can pass 105 cfs before overtopping of the lowest point on the dam occurs.

5.2 Design Data

No computations were found for the design of the dam. An engineering report dated January 2, 1979 gives the spillway capacity with flashboards of 200 cfs, with a frequency of occurrence of approximately 40 years (See Appendix B).

*Spillway level = level of 5.6 feet long x 0.5 feet deep slot.

5.3 Experience Data

There is no known record of the dam ever overtopping.

5.4 Test Flood Analysis

Based on the dam failure analysis, the dam is classified as "Significant" hazard potential. The size classification of the dam is "Small".

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Test Flood should be in the range of the 100 Year Flood to 1/2 the Probable Maximum Flood (1/2 PMF) depending on the involved risk.

A Test Flood equal to 1/2 PMF was selected because of the location of four downstream houses and their height above streambed.

Flood routing was started at Seymour Reservoir No. 4 Dam, the upper reservoir in the series. An inflow flood peak of 575 cfs was calculated for the 0.54 square mile watershed of Seymour Reservoir No. 4 Dam using 1,060 cubic feet per second per square mile (csm) from the guide curve for "rolling" terrain supplied by the Corps of Engineers. A triangular hydrograph was calculated using the methodology given in Design of Small Dams by the Bureau of Reclamation. The above peak inflow rate and a total runoff of 9.5 inches for the 1/2 PMF were used to calculate the inflow hydrograph to Seymour No. 4.

The flood was routed through Seymour No. 4 and the outflow was added to the inflow for the Seymour No. 3 watershed. The combined inflow hydrograph was then routed through Seymour No. 3 and added to

the inflow for Seymour No. 2. The routing was repeated to get the total inflow hydrograph for Seymour No. 1. All reservoirs were assumed to be initially at spillway level. For routing purposes, spillway capacity curves and storage capacity curves were prepared for each dam. The arithmetical trial-and-error tabular method was used for the routing.

Inflow is equal to outflow for Seymour No. 1 because of the small surcharge storage capacity.

The Test Flood produced a maximum discharge of 625 cfs at Seymour Reservoir No. 1 which would overtop the dam by 0.9 feet at the low point of the crest. The spillway discharge capacity of 105 cfs without flashboards is equal to 17 percent of the Test Flood.

The spillway capacity of this dam is judged to be inadequate. Overtopping of the dam could occur in the future.

5.5 Dam Failure Analysis

A dam failure analysis was made using the "Rule of Thumb" guidance provided by the Corps of Engineers. Failure was assumed with the water level at the top of the dam. The dam breach calculations show a peak release of 12,700 cfs into the valley below the dam.

The depth of flow in the stream in the area of the houses prior to dam breach is 1.3 feet, based on the maximum spillway capacity of 105 cfs. The peak flow in this area due to the dam breach is 3,500 cfs, equivalent to a depth of flow of 6.4 feet or approximately 1 foot below the sill elevation of the four houses. The dam is classified as "Significant" hazard potential because of the potential for the loss of a few lives should the dam fail.

The dam breach calculations and the flood areas are shown in Appendix D.

EVALUATION OF STRUCTURAL STABILITY
SECTION 6

6.1 Visual Observations

The visual inspection did not disclose any indications of structural instability.

6.2 Design and Construction Data

The design and construction data consists of a drawing showing a plan, cross section, and profile of the dam. A masonry core wall is shown but no information is presented regarding the type of soil in the earth embankment or foundation. Thus, the evaluation of stability is based on the visual inspection and past performance history.

6.3 Post-Construction Changes

Since the construction of the dam, three dams have been constructed upstream of Seymour Reservoir No. 1, and the spillway length has been decreased from 25 feet to 23 feet by the addition of a bridge across the spillway.

6.4 Seismic Stability

The dam is located in Seismic Zone 1 and in accordance with the recommended Phase I Inspection Guidelines does not warrant seismic stability analysis.

ASSESSMENT, RECOMMENDATIONS, & REMEDIAL MEASURES
SECTION 7

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection, the dam is judged to be in fair condition. Features that can affect the future integrity of the dam are the deterioration of the spillway weir and the seepage exiting at the toe and downstream of the dam.

An evaluation of the hydraulic and hydrologic features of the dam determined that the spillway is capable of passing 17 percent of the Test Flood (1/2 PMF). The earth embankment portion of the dam would be overtopped by 0.9 feet as a result of the Test Flood.

b. Adequacy of Information

The information available was sufficient for performing a Phase I Inspection.

c. Urgency

The recommendations presented in Section 7.2 and 7.3 should be carried out within one year of receipt of this Report by the owner.

7.2 Recommendations

The following recommendations should be carried out under the direction of a qualified, registered engineer:

1) Investigate the significance of the seepage downstream of the dam and design control measures if necessary.
2) Perform a detailed hydrologic and hydraulic analysis in order to determine the need for and means to provide additional project discharge capacity.

3) Design and construct repairs to the spillway weir and training walls.

4) The large pine tree at the right end of the downstream slope should be removed by uprooting and the root zones carefully backfilled with selected soils as directed by the engineer.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1) Bushes growing in the spillway discharge channel should be removed periodically to maintain the channel free of obstructions to flow.

2) The current program of technical inspections by qualified, registered engineers should continue with inspections being made annually.

3) A formal operations and maintenance manual for the dam and operating facilities should be prepared.

4) A formal warning system should be put into effect and include monitoring of the dam during extremely heavy rains (presently in effect), and procedures for notifying downstream authorities in the event of an emergency.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A

VISUAL CHECK LIST WITH COMMENTS

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT: Seymour Reservoir No. 1 Dam

DATE: 11/28/79 TIME: 9:00 a.m. WEATHER: Sunny - Approximately 40°

W.S. ELEVATION: 337.2 U.S. N/A DN.S

	PARTY	DISCIPLINE
1.	Donald L. Smith, P.E. - Roald Haestad, Inc.	Civil/Hydrologist
2.	Ronald G. Litke, P.E. - Roald Haestad, Inc.	Civil Engineer
3.	Gonzalo Castro, Ph.D., P.E. - Geotechnical Engineers, Inc.	Geotechnical Engineer
4.		
5.		
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam Embankment	GC	Good condition.
2.	Outlet Works-Intake Channel and Structure	DLS,RGL,GC	No intake channel. Intake structure is control tower.
3.	Outlet Works-Control Tower (Gate House)	DLS,RGL	Good, some cracking of brickwork.
4.	Outlet Works-Transition and Conduit	DLS,RGL	Could not be observed
5.	Outlet Works-Outlet Structure and Channel	DLS,RGL,GC	No outlet structure. Channel natural streambed.
6.	Outlet Works-Spillway Weir, App. & Disch.	DLS,RGL,GC	Concrete weir poor. Brush growing in channel.
7.	Outlet Works-Service Bridges	DLS,RGL	Both spillway and gate-house bridges good.
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 1 Dam DATE: 11/28/79

PROJECT FEATURE: Dam Embankment NAME: GC

DISCIPLINE: Geotechnical Engineer NAME:

AREA ELEVATION	CONDITIONS
DAM EMBANKMENT	
CREST ELEVATION	339
CURRENT POOL ELEVATION	337.2
MAXIMUM IMPOUNDMENT TO DATE	Unknown
SURFACE CRACKS	None observed
PAVEMENT CONDITION	Good condition
MOVEMENT OR SETTLEMENT OF CREST	Crest elevation somewhat uneven
LATERAL MOVEMENT	None observed
VERTICAL ALIGNMENT	Crest elevation somewhat uneven
HORIZONTAL ALIGNMENT	Too irregular to judge
CONDITION AT ABUTMENT	Good
INDICATIONS OF MOVEMENT OF STRUCTURAL ITEMS ON SLOPES	None observed
TRESPASSING ON SLOPES	None of significance
VEGETATION ON SLOPES	Downstream slope grass covered
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	Minor sloughing on downstream slope
ROCK SLOPE PROTECTION - RIPRAP FAILURES	Riprap in good condition
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
EMBANKMENT OR DOWNSTREAM SEEPAGE	Seepage at downstream toe and downstream of dam at several locations
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	None known
TOE DRAINS	Possibly a partial toe drain discharging through 8" ACP (approx. 2 gal/min)
INSTRUMENTATION SYSTEM	None known

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 1 Dam DATE: 11/26/79

PROJECT FEATURE: Outlet Works - Intake Channel and Structure NAME: GC

DISCIPLINE: Geotechnical and Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
A. APPROACH CHANNEL:	No channel visible
SLOPE CONDITIONS	N/A
BOTTOM CONDITIONS	N/A
ROCK SLIDES OR FALLS	N/A
LOG BOOM	N/A
DEBRIS	N/A
CONDITION OF CONCRETE LINING	N/A
DRAINS OR WEEP HOLES	N/A
B. INTAKE STRUCTURE:	Intake structure is a part of tower
CONDITION OF CONCRETE	N/A
STOP LOGS AND SLOTS	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Seyboth Reservoir No. 1 Dam DATE: 11/28/74

PROJECT FEATURE: Outlet Works - Control Tower NAME: EGL

DISCIPLINE: Civil Engineer NAME: DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER	
A. CONCRETE AND STRUCTURAL:	Brick house above water, stone masonry below water with concrete lining.
GENERAL CONDITION	Deterioration of brickwork at waterline. Remainder appears good.
CONDITION OF JOINTS	Some cracking present in brickwork of gate house
SPALLING	None observed
VISIBLE REINFORCING	None observed
RUSTING OR STAINING OF CONCRETE	None observed
ANY SEEPAGE OR EFFLORESCENCE	None observed
JOINT ALIGNMENT	Cracking in brickwork
UNUSUAL SEEPAGE OR LEAKS IN GATE CHAMBER	None observed Chambers are normally full.
CRACKS	Cracks present in brickwork.
RUSTING OR CORROSION OF STEEL	None observed
B. MECHANICAL AND ELECTRICAL:	
AIR VENTS	Screened opening
FLOAT WELLS	N/A
CRANE HOIST	N/A
ELEVATOR	N/A
HYDRAULIC SYSTEM	N/A
SERVICE GATES	Not operated or observed
EMERGENCY GATES	N/A
LIGHTNING PROTECTION SYSTEM	N/A
EMERGENCY POWER SYSTEM	N/A
WIRING AND LIGHTING SYSTEM IN GATE CHAMBER	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 1 Dam DATE: 11/2

PROJECT FEATURE: Outlet Works - Transition and Conduit NAME: R

DISCIPLINE: Civil Engineer NAME: D

AREA EVALUATED	CONDITIONS
OUTLET WORKS - TRANSITION AND CONDUIT	Two (2) 12-inch cast iron
GENERAL CONDITION OF CONCRETE	through dam. Could not b
RUST OR STAINING ON CONCRETE	
SPALLING	
EROSION OR CAVITATION	
CRACKING	
ALIGNMENT OF MONOLITHS	
ALIGNMENT OF JOINTS	
NUMBERING OF MONOLITHS	

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 1 Dam DATE: 11/28/79

PROJECT FEATURE: Outlet Works - Outlet Structure and Channel NAME: GC

DISCIPLINE: Geotechnical and Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	No outlet structure
GENERAL CONDITION OF CONCRETE	N/A
RUST OR STAINING	N/A
SPALLING	N/A
EROSION OR CAVITATION	N/A
VISIBLE REINFORCING	N/A
ANY SEEPAGE OR EFFLORESCENCE	N/A
CONDITION AT JOINTS	N/A
DRAIN HOLES	N/A
CHANNEL	Natural streambed
LOOSE ROCK OR TREES OVERHANGING CHANNEL	None of significance
CONDITION OF DISCHARGE CHANNEL	Good, brush in channel

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 1 Dam DATE: 11/28/79

PROJECT FEATURE: Outlet Works - Spillway Weir, Approach and Discharge Channel NAME: GC

DISCIPLINE: Geotechnical and Civil Engineers NAME: RGL, DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
A. APPROACH CHANNEL:	No channel visible
GENERAL CONDITION	N/A
LOOSE ROCK OVERHANGING CHANNEL	N/A
TREES OVERHANGING CHANNEL	N/A
FLOOR OF APPROACH CHANNEL	N/A
B. WEIR AND TRAINING WALLS:	
GENERAL CONDITION OF CONCRETE	Concrete weir in poor condition
RUST OR STAINING	None observed
SPALLING	Some spalling present
ANY VISIBLE REINFORCING	Yes
ANY SEEPAGE OR EFFLORESCENCE	Seepage between concrete weir and underlying stone masonry.
DRAIN HOLES	None observed, however, there are openings in the stone masonry walls.
C. DISCHARGE CHANNEL:	
GENERAL CONDITION	Good
LOOSE ROCK OVERHANGING CHANNEL	None observed
TREES OVERHANGING CHANNEL	None observed
FLOOR OF CHANNEL	Bouldery
OTHER OBSTRUCTIONS	Some bushes growing on channel bottom.

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 1 Dam DATE: 11/28/79

PROJECT FEATURE: Outlet Works - Service Bridges NAME: RGL

DISCIPLINE: Civil Engineer NAME: DLS

AREA EVALUATED	CONDITIONS	
OUTLET WORKS - SERVICE BRIDGE	Spillway	Gate House
A. SUPER STRUCTURE:		
BEARINGS	Beams bear on concrete	Beams bear on concrete
ANCHOR BOLTS	None	None
BRIDGE SEAT	Good	Good
LONGITUDINAL MEMBERS	Good	Good
UNDER SIDE OF DECK	Good	Could not be observed
SECONDARY BRACING	N/A	N/A
DECK	Wood deck appears to be new	Wood deck appears to be new
DRAINAGE SYSTEM	N/A	N/A
RAILINGS	None	Good
EXPANSION JOINTS	None	None
PAINT	Good	Good
B. ABUTMENT AND PIERS:		
GENERAL CONDITION OF CONCRETE	Good	Good
ALIGNMENT OF ABUTMENT	Good	Good
APPROACH TO BRIDGE	Normal	Normal
CONDITION OF SEAT AND BACKWALL	Good	Good

APPENDIX B

ENGINEERING DATA

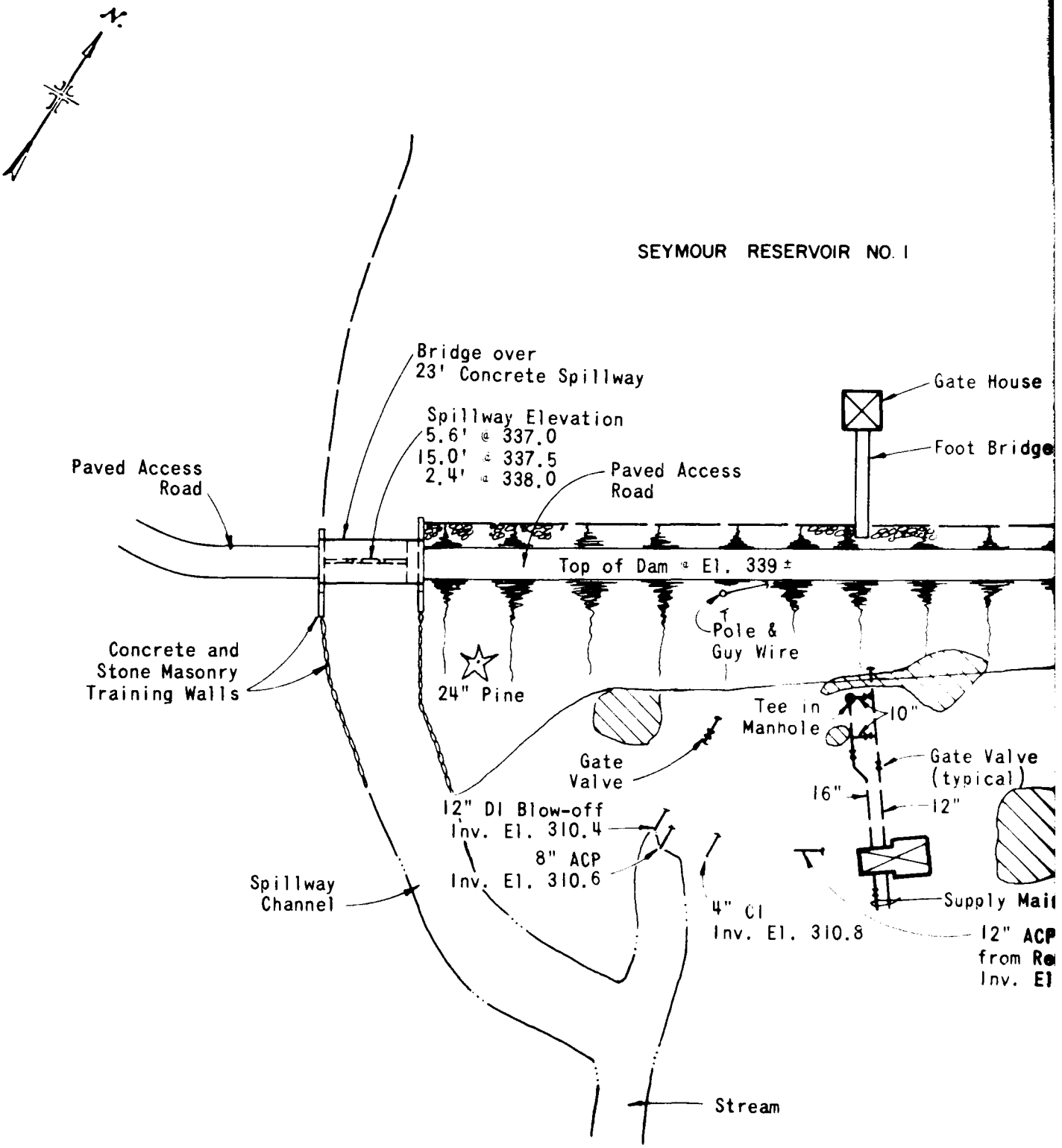
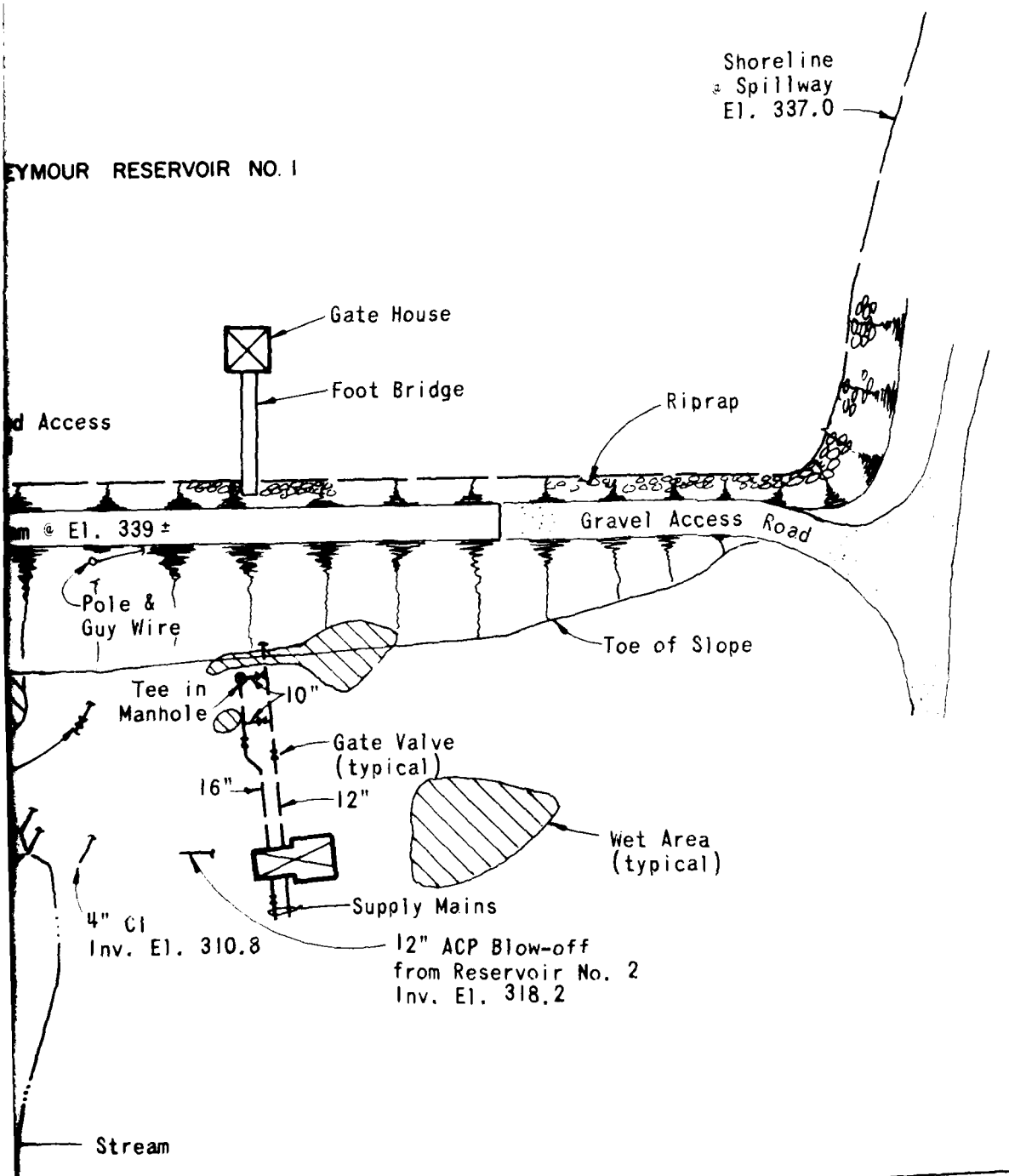

N
SEYMOUR RESERVOIR NO. 1
Bridge over
23' Concrete Spillway
Spillway Elevation
5.6' @ 337.0
15.0' @ 337.5
2.4' @ 338.0
Gate House
Foot Bridge
Paved Access
Road
Paved Access
Road
Top of Dam @ El. 339 ±
Pole &
Guy Wire
Concrete and
Stone Masonry
Training Walls
24" Pine
Tee in
Manhole
10"
Gate
Valve
Gate Valve
(typical)
16"
12"
12" DI Blow-off
Inv. El. 310.4
8" ACP
Inv. El. 310.6
Spillway
Channel
4" CI
Inv. El. 310.8
Supply Mai
12" ACP
from Re
Inv. El
Stream

FIGURE 2



ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

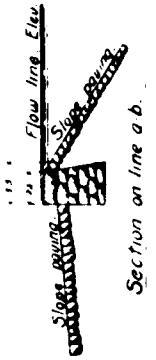
SEYMOUR RESERVOIR NO. I DAM

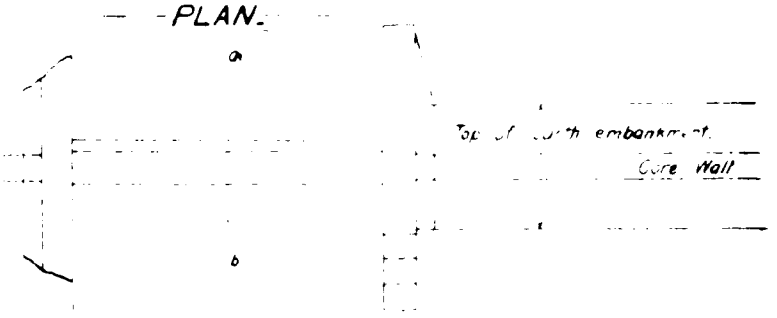
DRAWN	CHECKED	APPROVED	SCALE 1" = 40'
SS			DATE FEB 1980 PLATE B-1

LIST OF REFERENCES

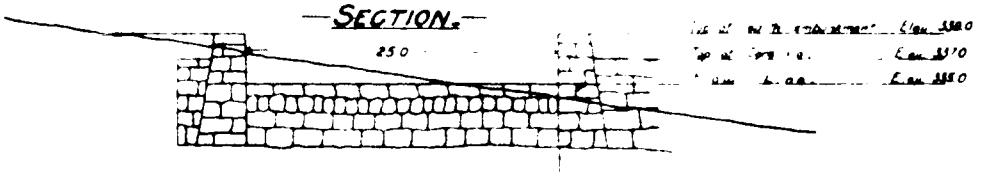
References are located at the Bridgeport Hydraulic Company, 835 Main Street, Bridgeport, Connecticut.

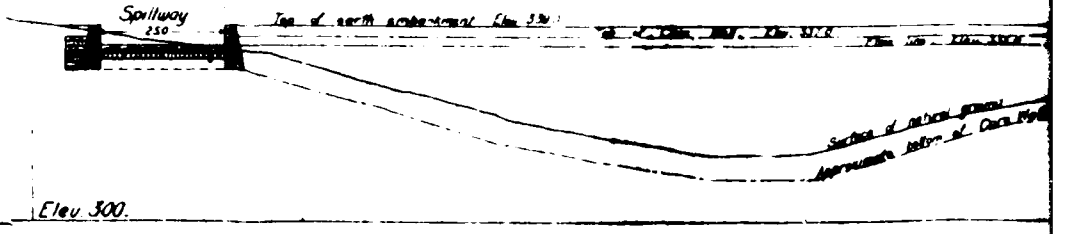
1. "Plan of Dam at Distributing Reservoir of the Seymour Water Company, Beacon Falls, Connecticut, 1898", by William G. Smith, Civil Engineer.
2. Contour map of Seymour Reservoir No. 1, below spillway level, August 1963.
3. Engineering Report, "Seymour No. 1", by Philip W. Genovese and Associates, Inc., January 1979.





SPILLWAY.
Scale 1" = 1'.



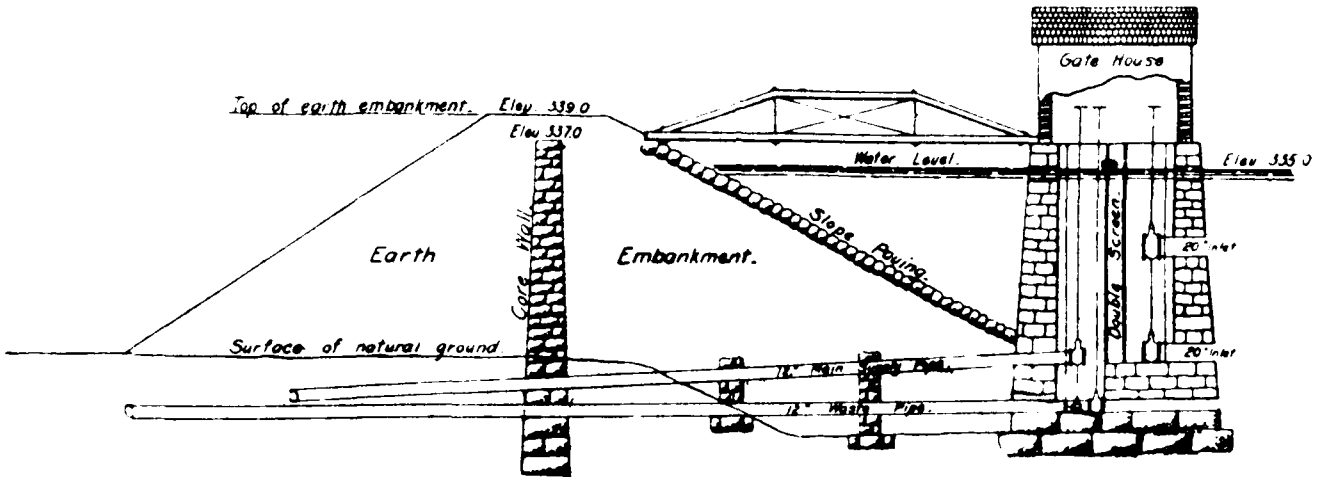


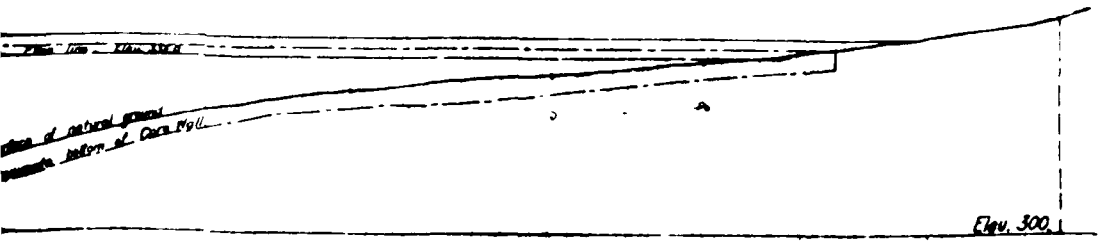
PROFILE ON CENTER L
Horizontal
Vertical
Scales 1"

PLAN OF DAM AT DISTRIBUTING RESERVOIR OF THE SEYMOUR WATER CO. BEACON FAL

SECTION THROUGH DAM AND GATE HOUSE.

Scale 1/8" = 1'





ON CENTER LINE OF DAM.

Horizontal } Scales 1" = 20'
Vertical }

OFFICE OF
WM. O. SMITH,
CIVIL ENGINEER,
Waterbury, Conn.
Feb. 2 1906.

BEACON FALIS, CONN. 1898. [NOT TO SCALE]

DAM INSPECTION — Bridgeport Hydraulic Company Dams

Name of Dam: Seymour Reservoir #1

I. PROJECT INFORMATION:

A. AUTHORITY:

This inspection was authorized by a letter from Bridgeport Hydraulic Company dated October, 13, 1978 to Philip W. Genovese & Associates, Inc. Said letter was signed by Edward Stangl, whose title is Manager - Project Engineering. The letter was also signed by Robert Reinert, Vice President of Engineering and Planning.

B. PURPOSE:

The purpose of the study is to perform inspection and evaluation of various Bridgeport Hydraulic Dams in terms of their safety.

C. DESCRIPTION:

Seymour Reservoir #1 is located in both Beacon Falls and Oxford, Conn., however, the dam itself is located in Beacon Falls, Seymour Reservoir #1 impounds an unnamed tributary which flows a distance of a few thousand feet from the dam to its confluence with the Naugatuck River. The Seymour Reservoir Dam #1 appears to be entirely an earthen dam.

Dam: Seymour Reservoir #1

D. PERTINENT DATA:

1.	Drainage Area:	1.38 square miles	883 acres
2.	Discharge at Dam:	Does not apply.	
3.	Elevation:	337 ft MSL/USGS Quad Sheet	
4.	Reservoir:	Length of maximum pool = 1,000 ft ±	
5.	Storage:	Does not apply.	
6.	Reservoir Surface:	Does not apply.	
7.	Dam:		
	Type:	Earthen Dam	
	Length:	300 ft ±	
	Height:	25 ft	
	Top Width:	25 ft	
	Side Slopes: Up Stream		unknown (under water)
	Down Stream		1.9 on one
8.	Diversion and Regulating Controls:	Does not apply.	
9.	Spillway:	See Attached Sketch	
	Type:	Concrete and Cement Rubble Masonry	
	Length of Weir:	See Attached Sketch	
	Gates:	None	
	Up Stream Channel:	See Attached Sketch	
	Down Stream Channel:	See Attached Sketch	

Dam: Seymour Reservoir #1

II. ENGINEERING DATA (Existing):

A plan of the dam dated 2/2/1906 from the office of W-G Smith, Civil Engineer, indicates a core wall of stone was included in the design.

III. VISUAL INSPECTION:

A. FINDINGS:

The earth embankment appears to be generally stable, but there are two deficiencies that were noticed during the visual inspection. These include settlement on the down stream side of the embankment up to approximately 1 foot. Also two small seeps were observed on the down stream side of the embankment, at approximately the center line of the dam at the toe of the slope and the other one approximately 50 feet west of the center line of the dam. The seeps are minor in nature and carried no sediment. Slope protection of the embankment was observed to be in the form of stone rip-rap on the up stream side and stable grass on the down stream side. The steepness of the down stream slope of the embankment, which was approximately 1.9 on 1, is probably too steep by modern day standards. However, it must be regarded as stable.

B. EVALUATION:

The dam appears to be in good condition with the exception of the deficiencies mentioned under "FINDINGS".

V. OPERATIONAL PROCEDURES:

Does not apply

VI. HYDROLOGY AND HYDRAULIC ANALYSES:

The results of the analysis of the hydrology and hydraulics of the dam indicate that the dam would be over-topped at a flow of 200 cfs , which compares to a frequency of approximately 40 years. The data also indicate that if the dam is raised 1 foot in height, the spillway would accommodate a flow of 380 cfs which compares to a frequency of approximately 88 years. Hydraulic control for this structure is:

Control	Flow (cfs)	Frequency (years)
Top of Dam	200	40
Bottom of Bridge	420	115

VII. STRUCTURAL STABILITY:

A. VISUAL OBSERVATION:

1. Embankment: Visual examination of the embankment indicates no serious structural problems. There are two minor seeps and some minimum settlement that were observed on the down stream slope of the embankment.

2. Appurtenant Structures: Visual inspection indicates no significant structural problems.

Dam: Seymour Reservoir #1

B. DESIGN AND CONSTRUCTION DATA:

Does not apply

C. OPERATING RECORDS:

Does not apply

D. POST CONSTRUCTION CHANGES:

Does not apply

E. SEISMIC STABILITY:

The dam is located in seismic zone #1.

VII. DAM ASSESSMENT:

Visual inspections of the dam indicates generally good condition. tion designation means the facility requires action within 2 to 3 y owner for the specific areas described.

Items that require action are:

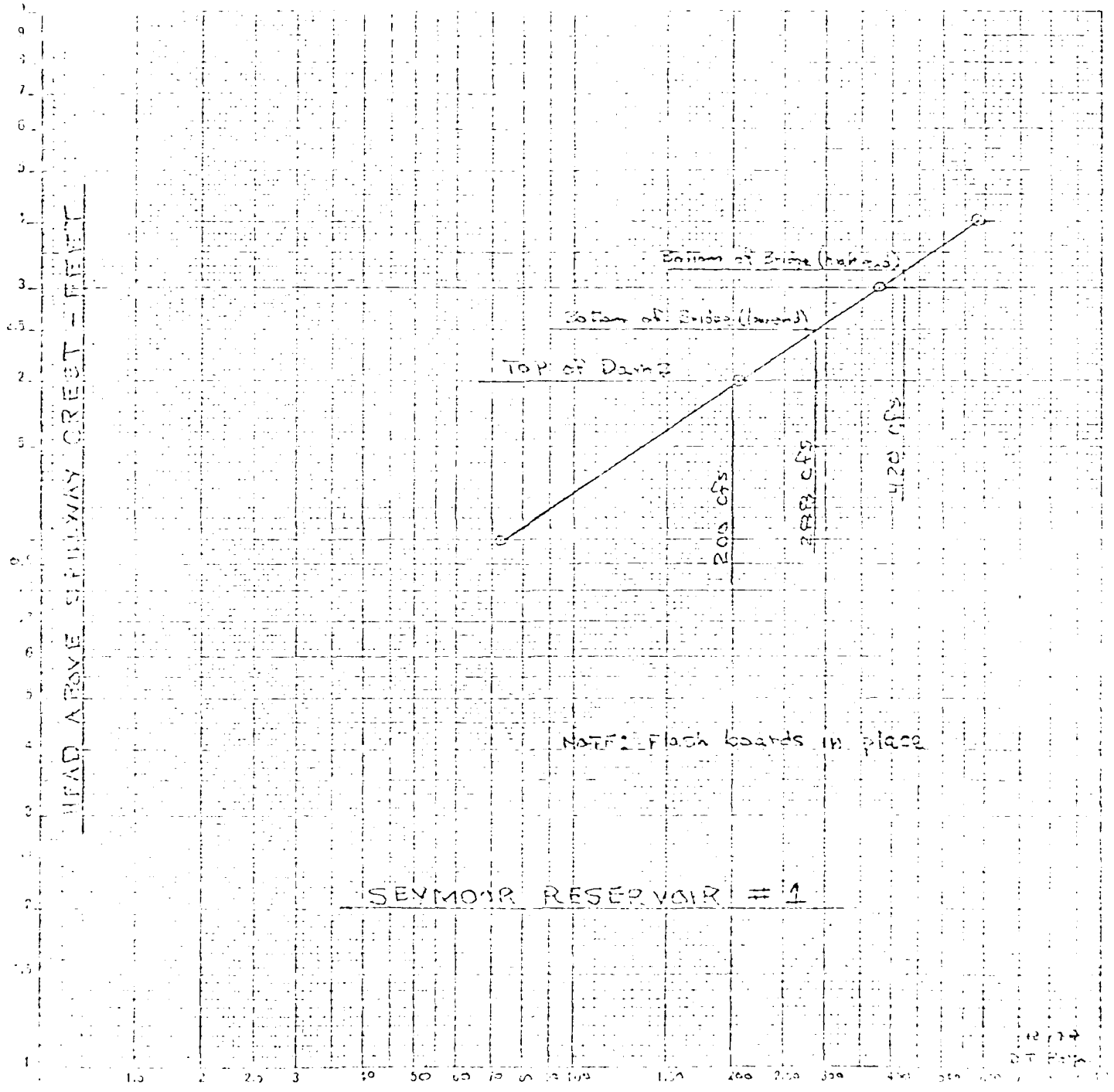
1. Filling of areas of settlement;
2. Monitoring of seeps;
3. Raising of dam;
4. Further investigation of the entire series of Seymour dams respect to breaching and potential downstream damage to r new development on Pine Bridge Road.

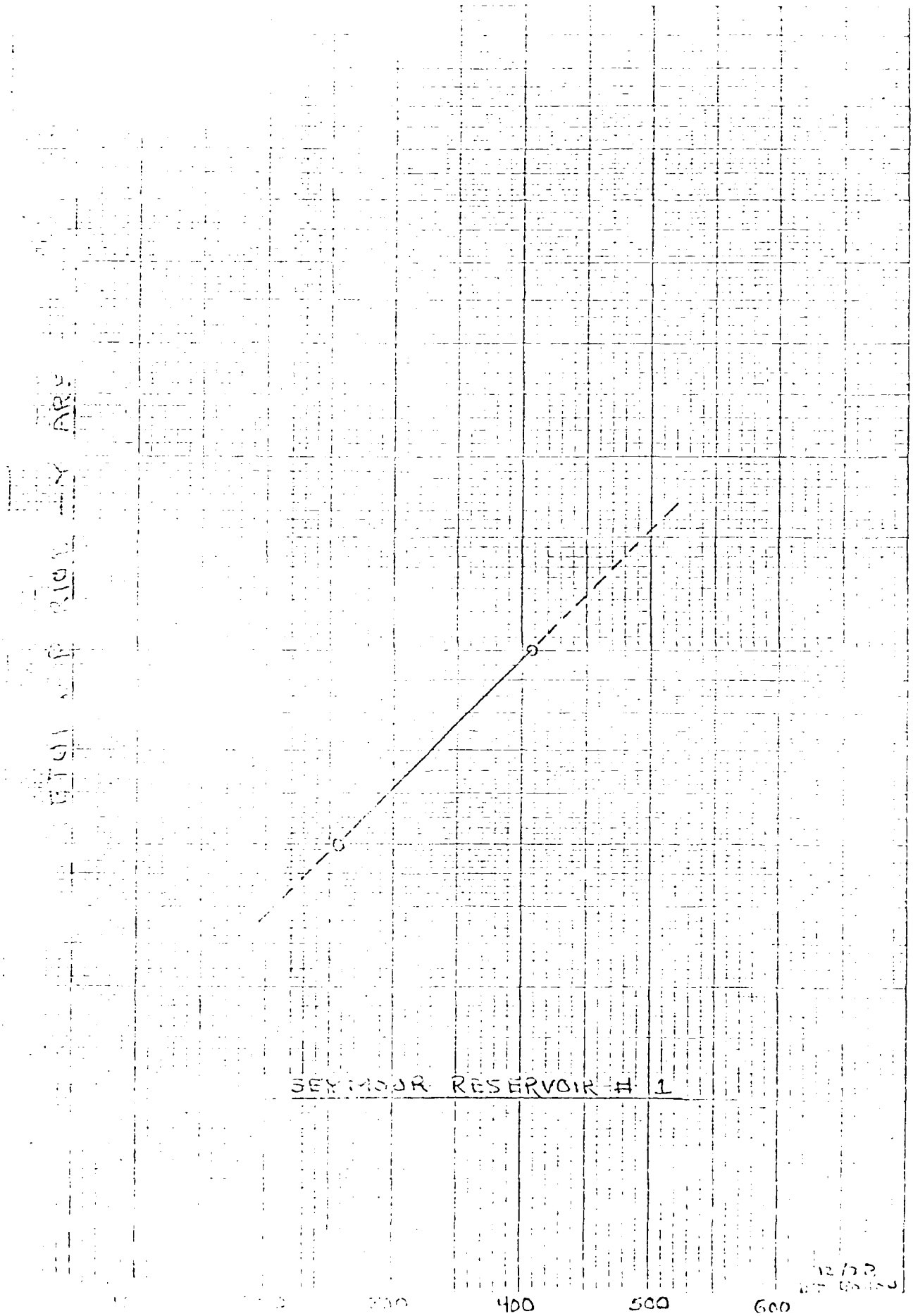
Areas of settlement should be backfilled with suitable fill materi appropriate grass cover planted.

Dam: Seymour Reservoir #1

Seepage should be monitored on a monthly basis and records maintained on quantity, color and solids content (photographs are recommended). The dam should be raised to an elevation to prevent overtopping at a frequency less than the existing condition which indicates the dam would be overtopped at a return period of 40 years.

Prepared by: Robert L. Jones, P.E.
Project Engineer


HEAD ABOVE SPILLWAY CREST - FEET
Bottom of Bridge (Ahead)
Bottom of Bridge (Upward)
Top of Dam?
200 cfs
288 cfs
450 cfs
NOTE: Flash boards in place
SEYMOUR RESERVOIR #1
SPILLWAY DISCHARGE - CFS.



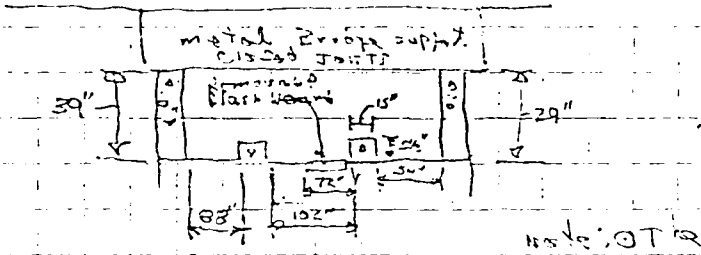
SEYMOUR RESERVOIR # 1

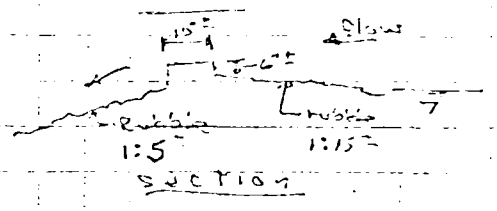
MAX DISCHARGE - C.F.S

Seymour Reservoir #1

11/7/78
Date 10:45AM
DTB

West — Road over — East





Looking U.S.

Note: OTR 72" flash board length includes the 2½" slot

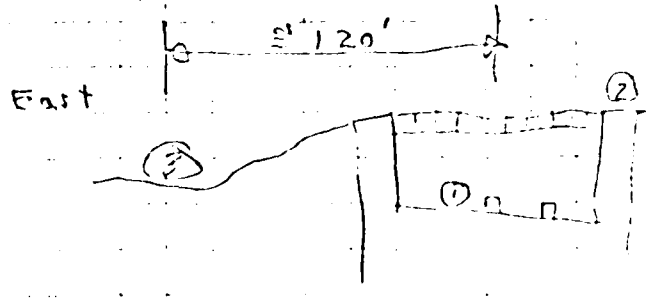
@ Flash board is 5" high on average

11/25/78

Seymour Reservoir #1

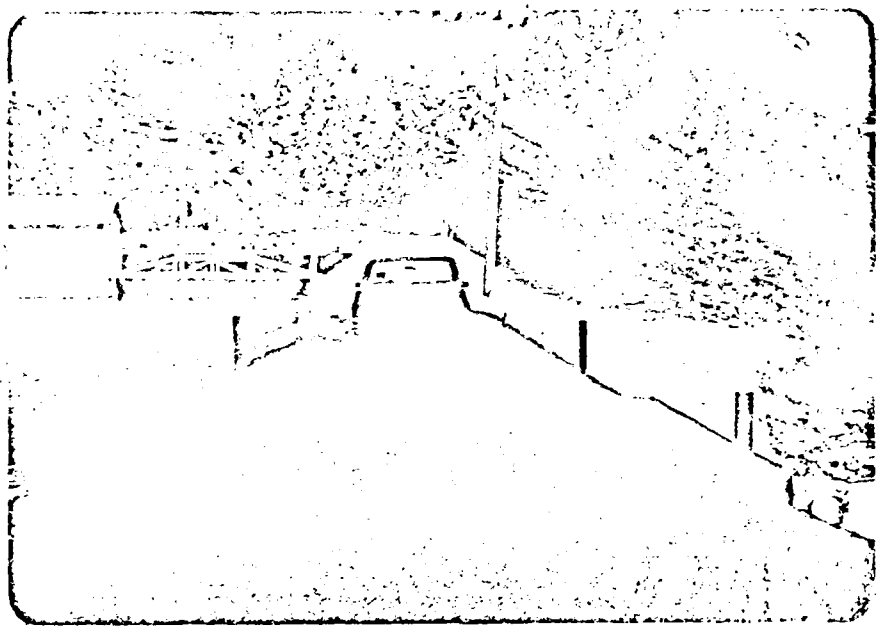
Seymour Ct

	BS	FS	Flow	
①	9.89			spun y cast
②		4.66		Tap Conn
③		7.91		Flow from in this line



Looking B-12 >5

SEYMOUR RESERVOIR #1



APPENDIX C

PHOTOGRAPHS

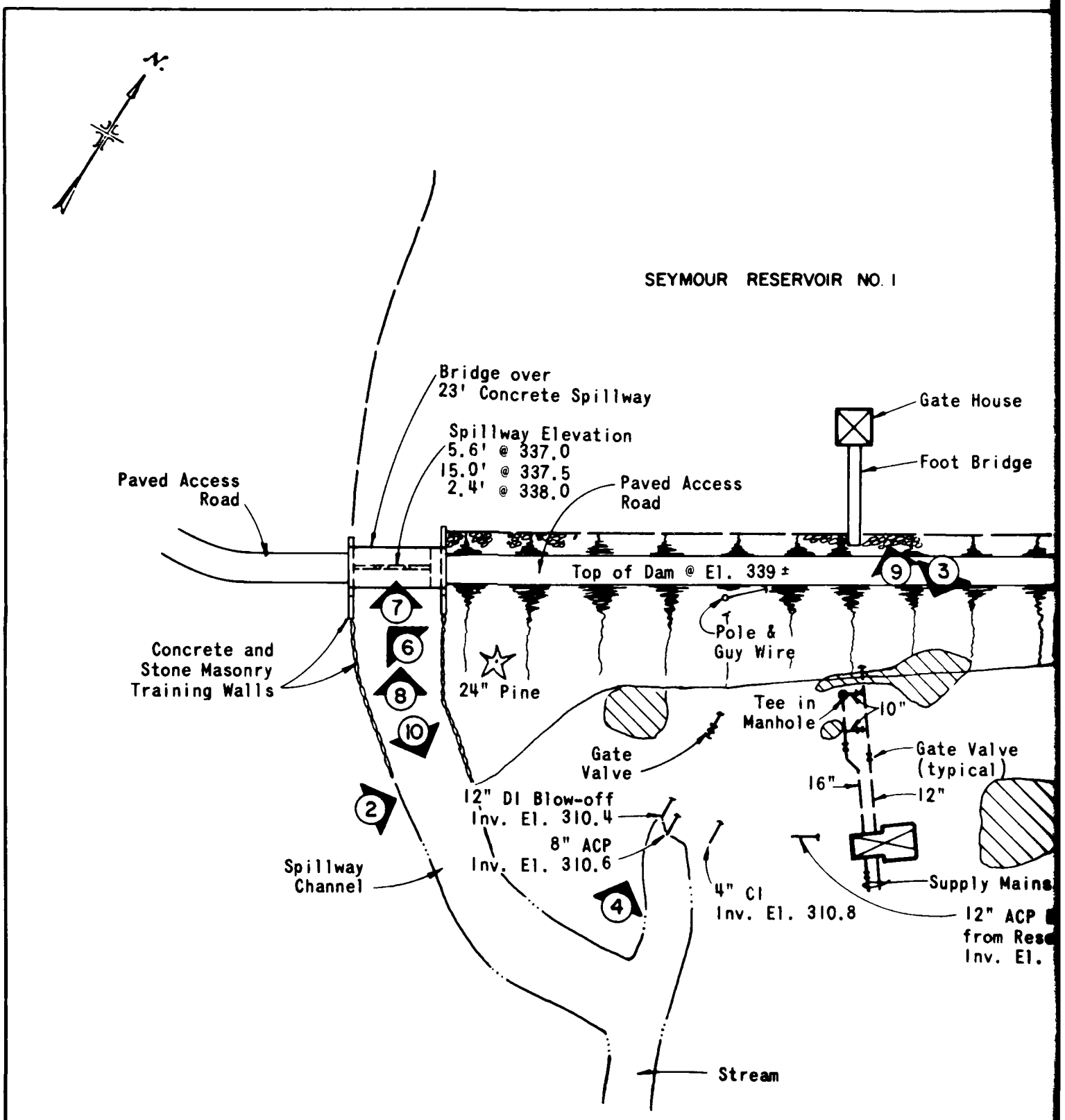
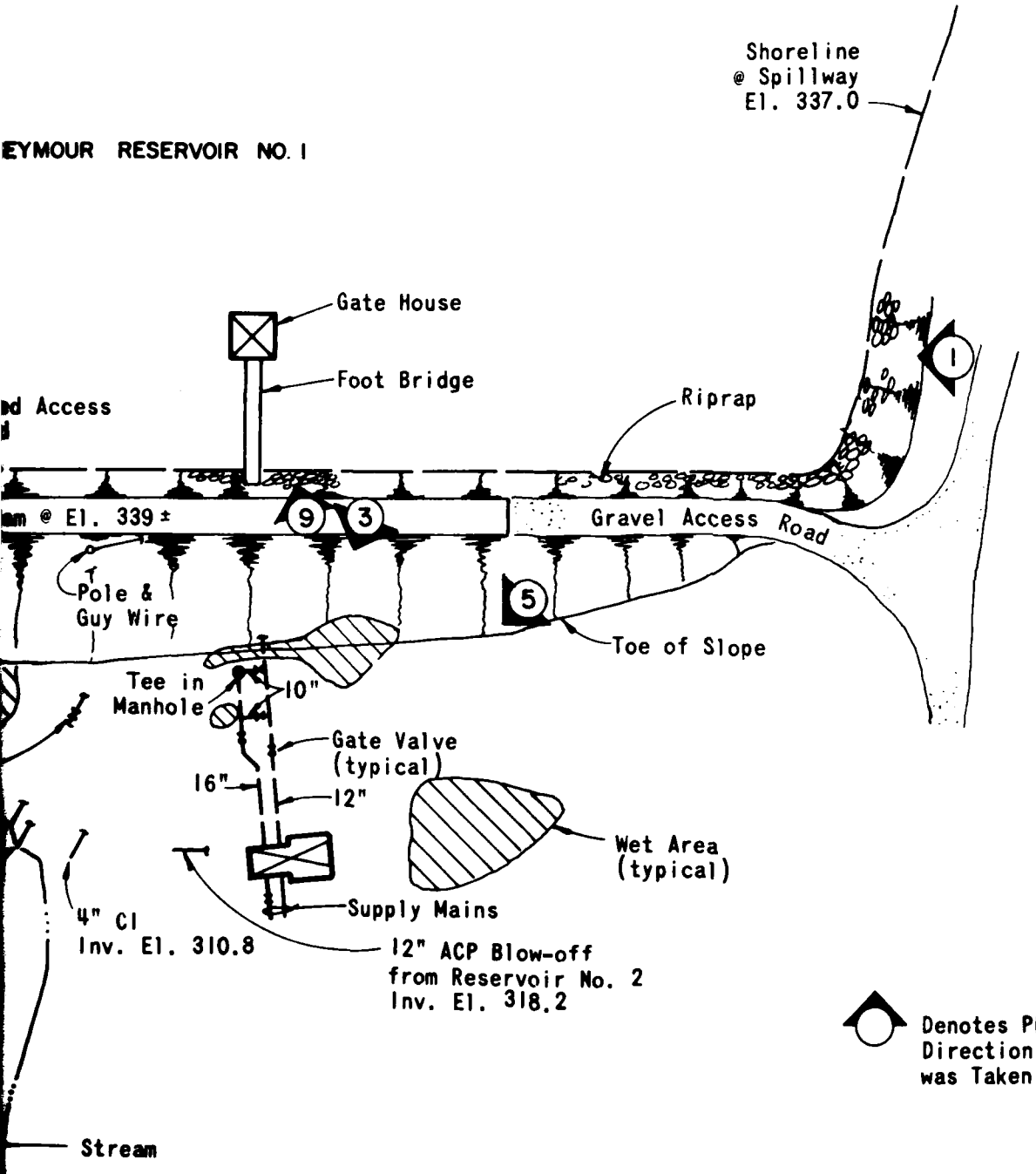

N.
SEYMOUR RESERVOIR NO. 1
Bridge over
23' Concrete Spillway
Spillway Elevation
5.6' @ 337.0
15.0' @ 337.5
2.4' @ 338.0
Gate House
Foot Bridge
Paved Access
Road
Paved Access
Road
Top of Dam @ El. 339 ±
9
3
7
6
8
10
Concrete and
Stone Masonry
Training Walls
24" Pine
Pole &
Guy Wire
Tee in
Manhole
10"
Gate
Valve
Gate Valve
(typical)
16"
12"
12" DI Blow-off
Inv. El. 310.4
8" ACP
Inv. El. 310.6
2
Spillway
Channel
4
4" CI
Inv. El. 310.8
Supply Mains
12" ACP
from Res
Inv. El.
Stream

FIGURE 3



Denotes Photo Number and Direction in which Photo was Taken

ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON FED DAMS

PHOTO LOCATION PLAN

SEYMOUR RESERVOIR NO 1 DAM

BEACON FALLS, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALE 1" = 40'
JRS	DLS		DATE FEB 1980 PAGE C-1

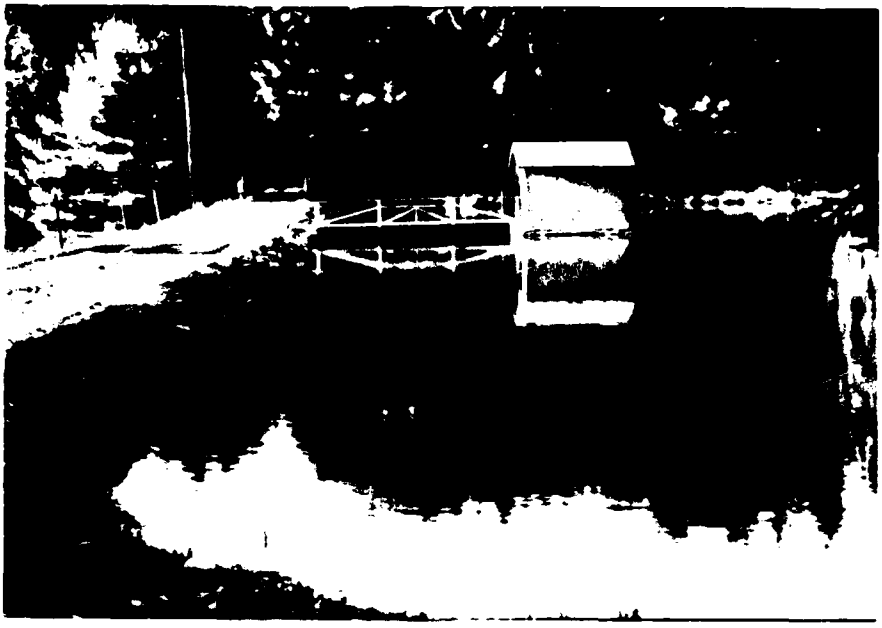


PHOTO NO. 1

GENERAL VIEW OF DAM
FROM LEFT ABUTMENT

PHOTO NO. 2

DOWNSTREAM SLOPE VIEWED
FROM SPILLWAY CHANNEL

U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SEYMOUR RES. NO. 1 DAM TR. TO HEMP SWAMP BR. BEACON FALLS, CT. CT 00358 28 NOV 79

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

HOALD HARSTAD, INC.
CONSULTING ENGINEERS
[illegible]

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

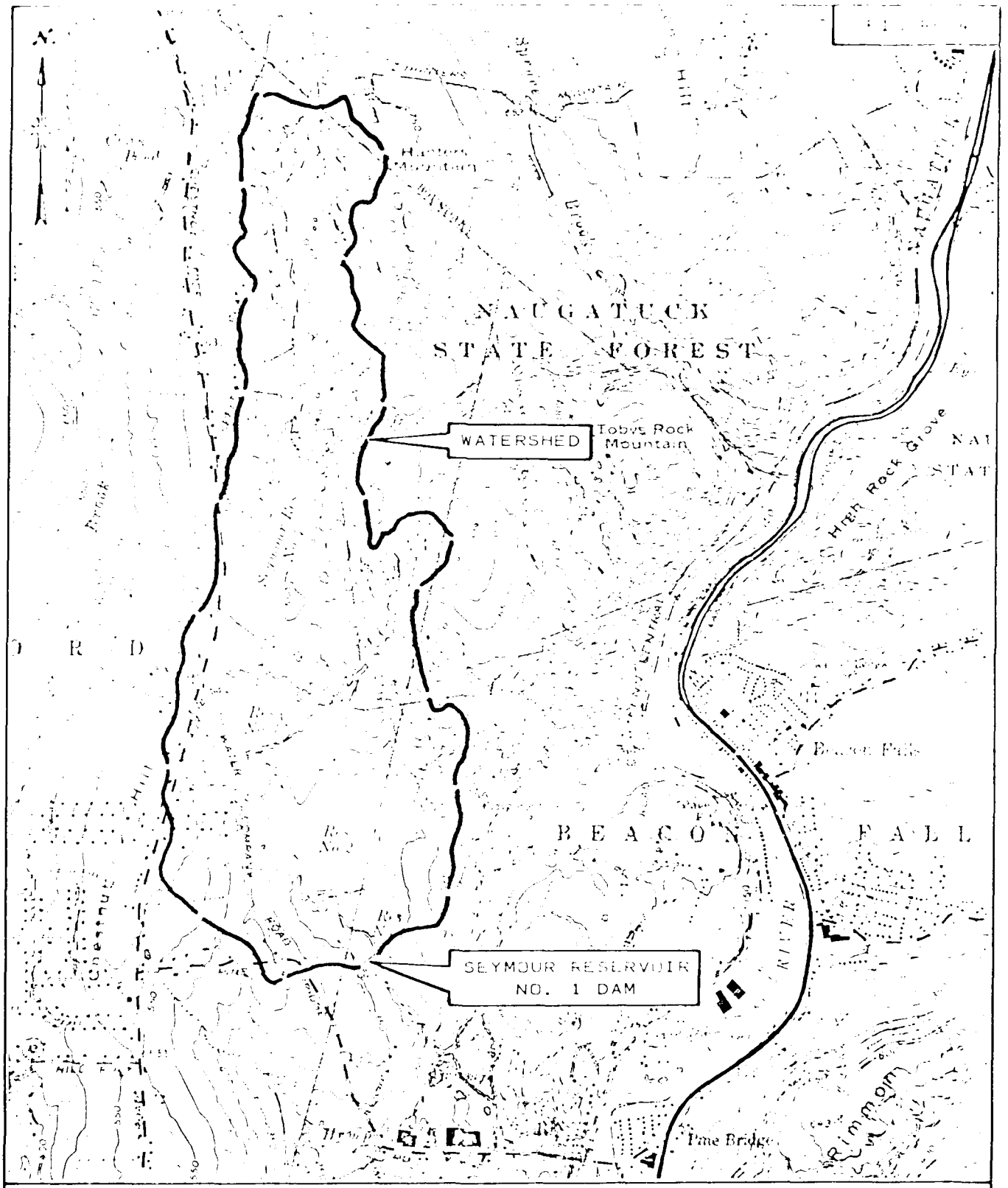
NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

NATIONAL PROGRAM OF
INSPECTION OF
NON FED. DAMS

U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
HOWARD NEEDLES TAMMEN & BERGENDOFF CONSULTING ENGINEERS KANSAS CITY, MISSOURI		

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



WATERSHED MAP

SEYMOUR RESERVOIR NO. 1 DAM
BEACON FALLS, CONNECTICUT

SCALE: 1" = 2000'

ROALD HALSTAD, INC. NAUGATUCK QUADRANGLE 197?

BY ...DAS.... DATE ..1/7/80... **ROALD HAESTAD, INC.** SHEET NO ...1.... OF ...28...

CONSULTING ENGINEERS

CKD BY ..SL.. DATE ..1/14/80... 37 Brookside Road - Waterbury, Conn. 06708 JOB NO ...045.09.....

SUBJECT .....SEYMOUR NO. 1 - Spillway Capacity.....

WATERSHED AREA = 1.4 SQUARE MILES

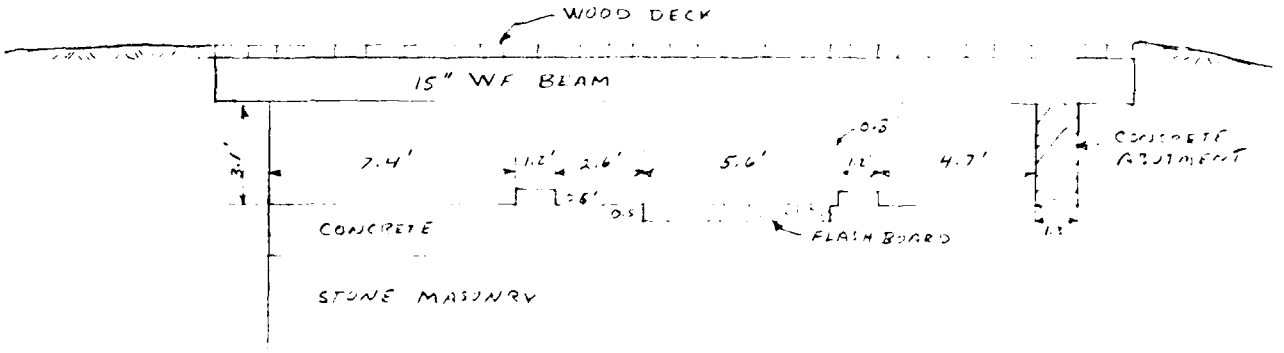
WATER SURFACE AREA = 5.1 ACRES

STORAGE CAPACITY AT SPILLWAY = 39 ACRE-FEET

STORAGE CAPACITY AT CREST = 49 ACRE-FEET

SPILLWAY CAPACITY

SCALE 3/16" = 1'-0"



SPILLWAY

SECT	ELEV.	LENGTH	COEF	
(1.)	337.0	5.6'	2.8	
(2.)	337.5	15.0'	2.8	
(3.)	338.0	2.4'	2.8	
(4)	339.0	300'	2.7	DAM CREST
(5.)	340.0	25'	2.7	" "

LOW POINT OF DAM CREST - EL 338.8

$Q = C L H^{3/2}$

$Q = 2.8(5.6)1.8^{3/2} + 2.8(15.0)(1.3)^{3/2} + 2.8(2.4)(0.8)^{3/2}$

$Q = 37.9 + 62.3 + 7.8$

$Q = \underline{105 \text{ CFS}}$

BY DLS DATE 1/7/80 **ROALD HAESTAD, INC.** SHEET NO. 2 OF 28

CONSULTING ENGINEERS

CKD BY SL DATE 1/14/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-09

SUBJECT SEYMOUR NO. 1 - SPILLWAY CAPACITY

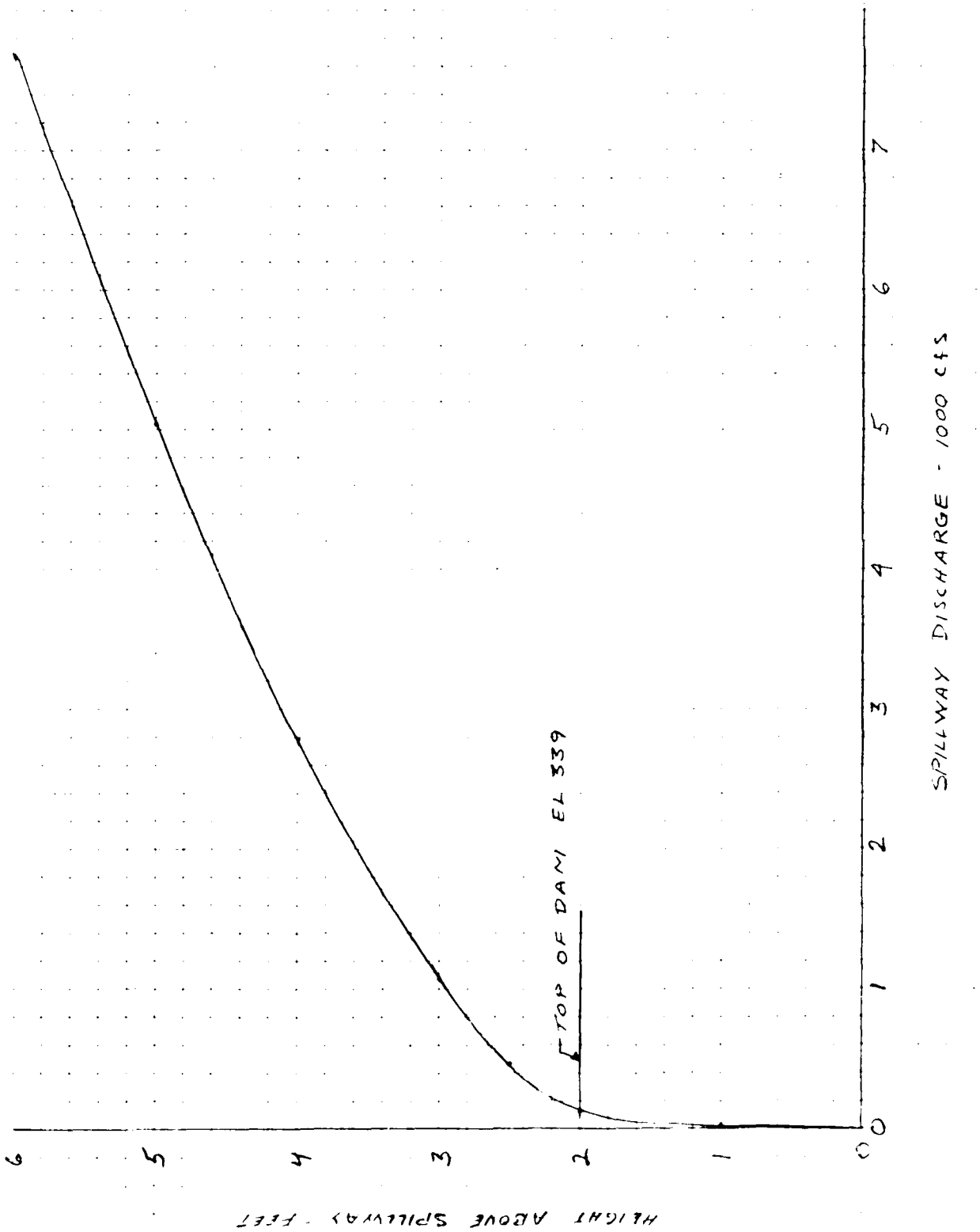
	SECTION NO'S.					
ELEV.	(1)	(2)	(3)	(4)	(5)	TOTAL CFS
337.0	0	0	0	0	0	0
337.5	5	0	0	0	0	5
338.0	16	15	0	0	0	31
339.0	44	77	7	0	0	128
339.5	62	119	12	286	0	479
340.0	81	166	19	810	0	1076
341.0	125	275	35	2291	68	2794
342.0	175	401	54	4209	191	5030
343.0	230	542	75	6480	351	7678
344.0	290	696	99	9056	540	10,681
346.0	423	1041	152	15,000	992	17,608
348.0	572	1429	213	21,970	1527	25,611
350.0	735	1856	279	29,551	2135	34,556

BY DAS DATE 1/8/80 **ROALD HAESTAD, INC.** SHEET NO 3 OF 28

CONSULTING ENGINEERS

CKD BY SL DATE 1/14/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-29

SUBJECT SEYMOUR DAM NO. 1 SPILLWAY CAPACITY



BY SA DATE 1/8/80 **ROALD HAESTAD, INC.** SHEET NO 4 OF 29

CONSULTING ENGINEERS

CKD BY RHS DATE 1/11/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049.09

SUBJECT SEYMOUR NO. 1 - Dam Storage Capacity Above Spillway

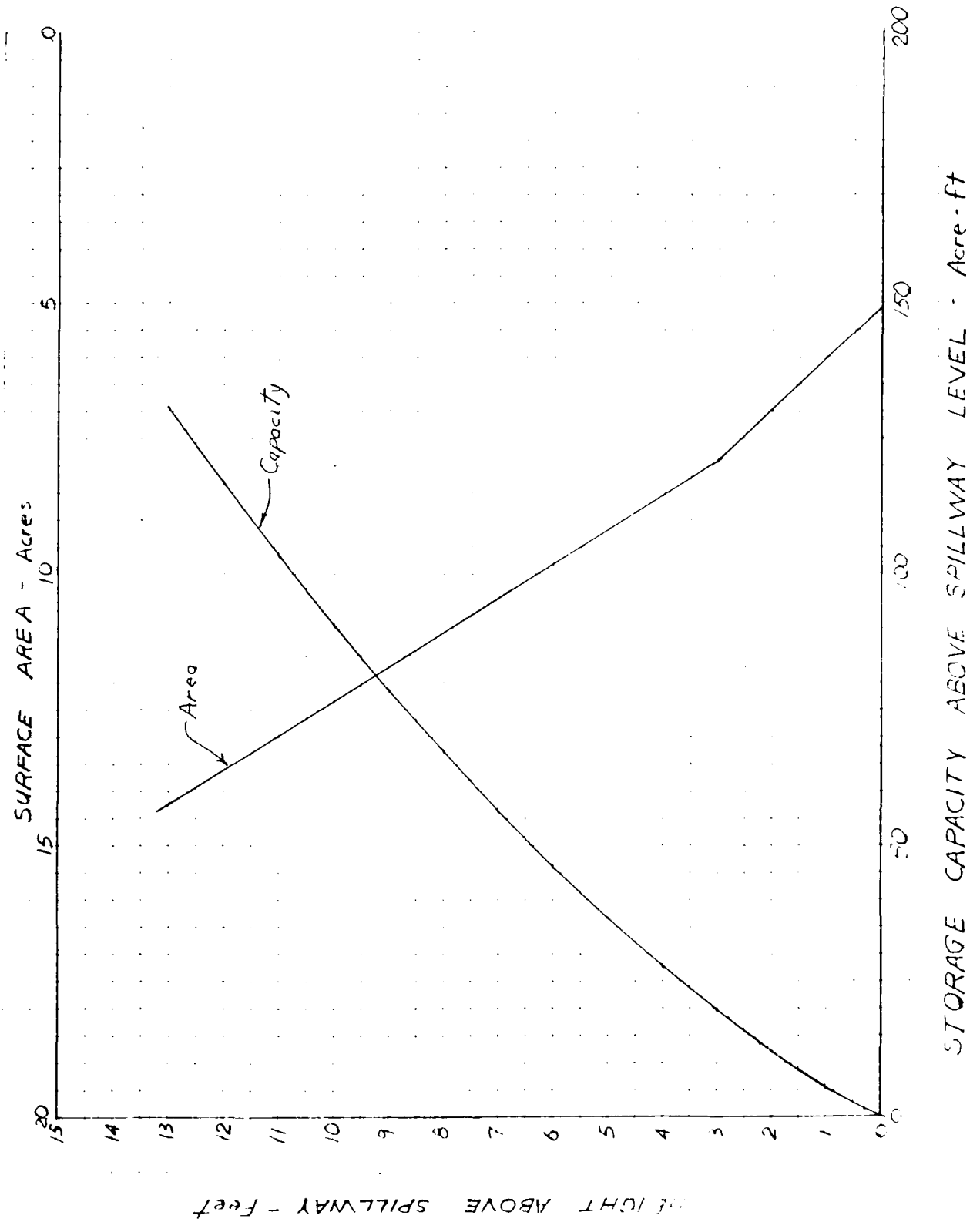
Height above Spillway (feet)	Surface Area (acres)	Average Surface Area (Acres)	Storage Capacity (Acre-ft)
0	5.1		0
		5.6	
1	6.0		5.6
		6.5	
2	7.0		12.0
		7.5	
3	7.9		19.5
		8.3	
4	8.6		27.8
		8.9	
5	9.2		36.7
		9.5	
6	9.8		46.2
		10.2	
7	10.5		56.4
		10.8	
8	11.1		67.2
		11.4	
9	11.7		78.6
		12.0	
10	12.3		90.6
		12.7	
11	13.0		103.3
		13.3	
12	13.6		116.6
		14.0	
13	14.3		130.6

BY SL DATE 1/8/80 **ROALD HAESTAD, INC.** SHEET NO 5 OF 28

CONSULTING ENGINEERS

CKD BY DLS DATE 1/11/80 37 Brookside Road - Waterbury, Conn 06708 JOB NO 047-07

SUBJECT SEYMOUR NO. 1 - Area - Capacity Curve



BY DLS DATE 1/22/80 **ROALD HAESTAD, INC.** SHEET NO 6 OF 28

CONSULTING ENGINEERS

CKD BY SL DATE 1/28/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 042.09

SUBJECT SEYMOUR NO. 1 TEST FLOOD ½ PMF

THE TEST FLOOD ROUTING FOR SEYMOUR NO 1 WAS DEVELOPED BY CALCULATING AN INFLOW HYDROGRAPH FOR SEYMOUR NO. 4, ROUTING THE FLOOD THROUGH THE RESERVOIR AND ADDING THE OUTFLOW TO THE INFLOW OF THE SEYMOUR NO. 3 RESERVOIR. THE ROUTING WAS CONTINUED THROUGH RESERVOIR NO. 2.

THE RESERVOIR AT SEYMOUR NO. 1 WAS TOO SMALL TO AFFECT THE FLOOD FLOWS SO THAT INFLOW AND OUTFLOW ARE EQUAL.

THE FLOOD ROUTING CALCULATIONS FOR ALL FOUR DAMS FOLLOW.

BY DLS DATE 1/8/80 **ROALD HAESTAD, INC.** SHEET NO 7 OF 28

CONSULTING ENGINEERS

CKD BY SL DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 042-12

SUBJECT SEYMOUR RES. NO.4 DAM - TEST FLOOD - ½ PMF

TEST FLOOD = ½ PMF

DRAINAGE AREA = 343 ACRES = 0.54 Sq. Mi.

FROM CORPS OF ENG. CHART FOR "ROLLING" TERRAIN

MPF = 2,125 cfs / Sq. Mi (2.0 Sq. Mi. MINIMUM)

PMF = 2,125 x 0.54 sq. mi. = 1148 CFS

½ PMF = ½ (1148) = 574 CFS

USE VOLUME OF RUNOFF = 9.5" = 274 Ac-Ft.

FROM DESIGN OF SMALL DAMS

$$q_p = \frac{484 A Q}{T_p} \qquad T_b = 2.67 T_p$$

q_p = PEAK RATE OF RUNOFF - CFS

A = DRAINAGE AREA - Sq. Mi.

Q = TOTAL RUNOFF IN INCHES

T_p = TIME IN HOURS FROM START OF RISE TO PEAK

T_b = TIME BASE OF HYDROGRAPH IN HOURS

$$574 = \frac{484 (0.54)(9.5)}{T_p}$$

T_p = 4.3 HOURS

T_b = 2.67 (4.3) = 11.5 HOURS

BY DLS DATE 1/14/80

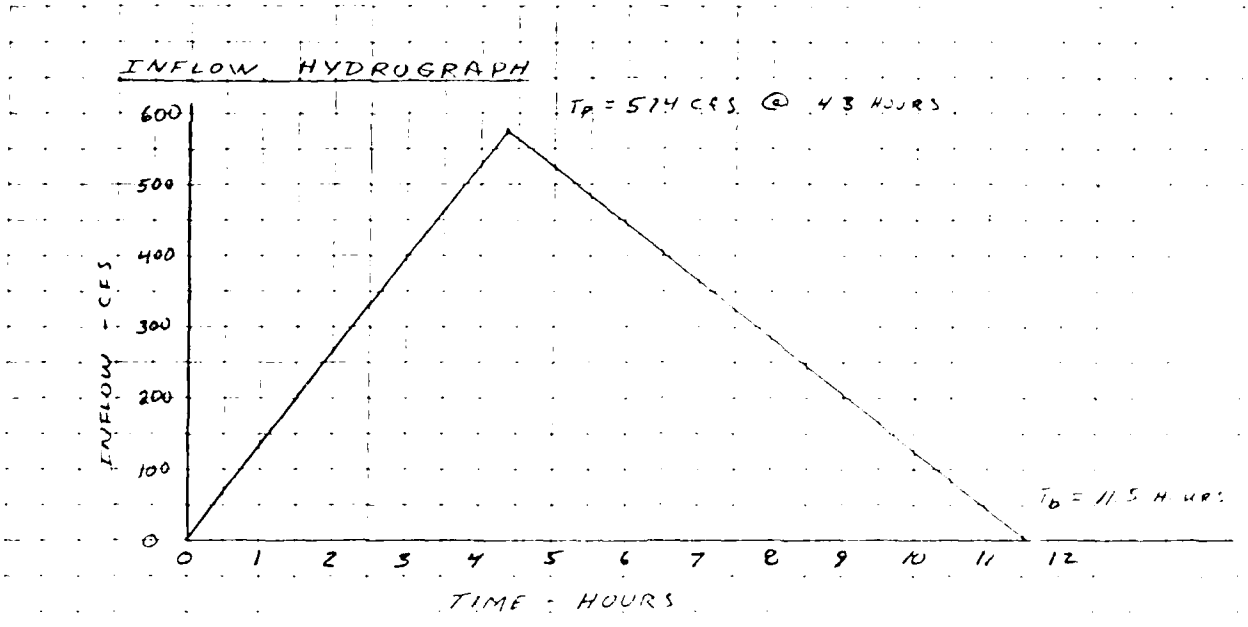
ROALD HAESTAD, INC.
CONSULTING ENGINEERS
37 Brookside Road - Waterbury, Conn 06708

SHEET NO 8 OF 22

CKD BY SL DATE 1/14/80

JOB NO 049-12

SUBJECT SEYMOUR NO. 4 - TEST FLOOD - 1/2 PMF

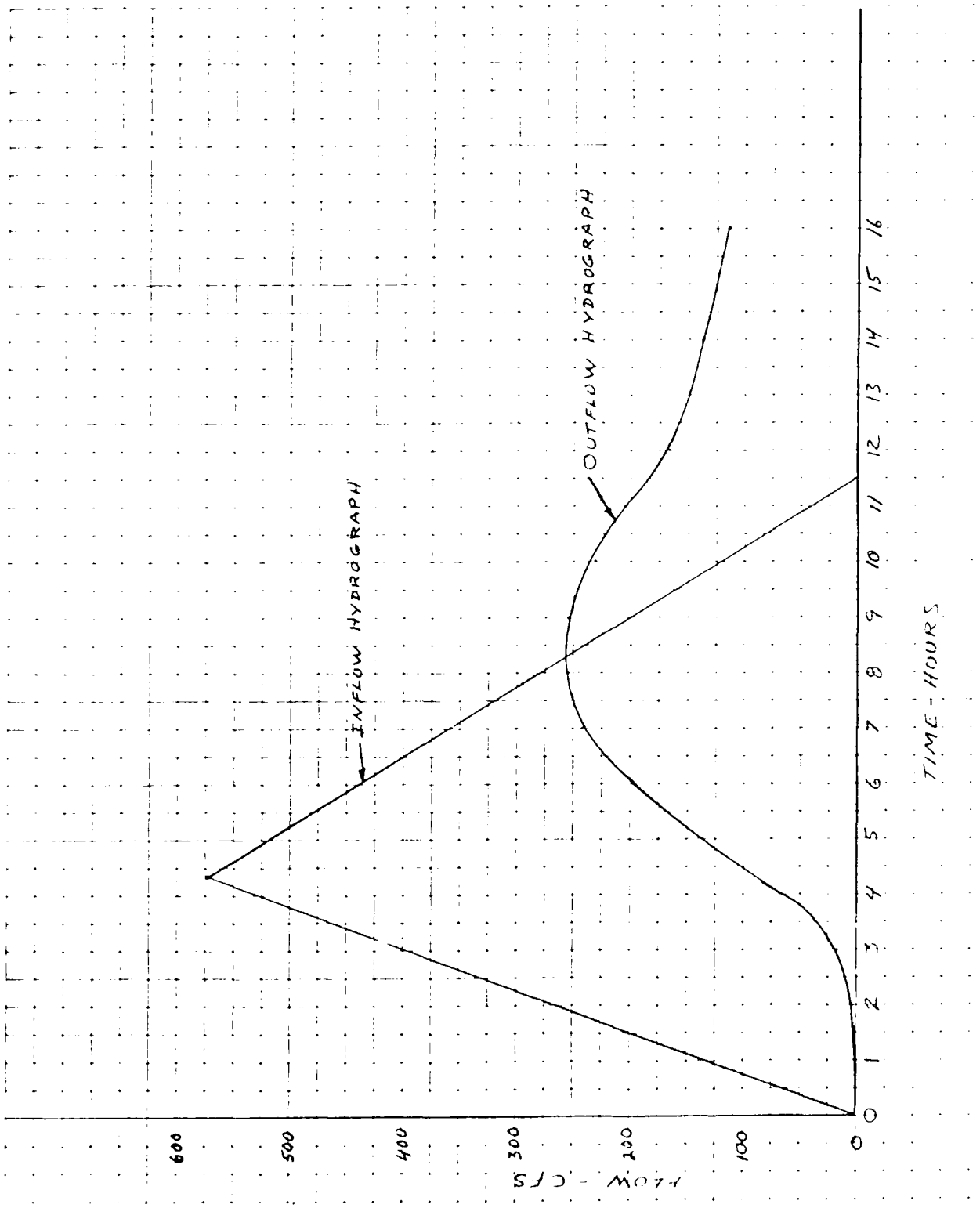


BY D.L.S. DATE 1/10/80 **ROALD HAESTAD, INC.** SHEET NO. 2 OF 5

CONSULTING ENGINEERS

CKD BY S.L. DATE 1/11/80 37 Brookside Road - Waterbury, Conn 06708 JOB NO. 049-12

SUBJECT SEYMOUR NO. 4 - FLOOD ROUTING



BY SL DATE 1/9/80 ROALD HALSTAD, INC. SHEET NO 19 OF 28
CHKD BY DLS DATE 1/11/80 CONSULTING ENGINEERS JOB NO 049-12
SUBJECT SEYMOUR NO. 4 - Flood Routing

TIME Δt HOURS	AVERAGE RATE OF INFLOW Q_i Δt SEC-FT.	AVERAGE INFLOW ACRE-FEET	TRIAL RES. STORAGE EL. END OF Δt	AVERAGE RATE OF OUTFLOW Q_o SEC-FT.	AVERAGE OUTFLOW FOR Δt ACRE-FEET	INCREMENTAL STORAGE, ΔS ACRE-FEET	TOTAL STORAGE ACRE-FEET	RESERVOIR ELEVATION END OF Δt
0	0			0			0	
1	65	5.4	~~5326.2~~	1	0	5.4	5.4	~~5321~~
			5321	1	0	5.4	5.4	5321
	200	16.5	5325	3	0	16.5	21.9	5325
2								
	335	27.7	~~5336~~	7	1	26.7	~~48.6~~	~~5332~~
3			5332	4	1	26.7	48.6	5332
	463	38.3	~~5345~~	21	2	36.3	~~84.9~~	~~5340~~
4			5340	38	3	35.3	83.9	5340
	540	44.6	~~5356~~	104	9	35.6	~~119.5~~	~~5349~~
5			5349	104	9	35.6	119.5	5349
	485	40.1	~~5360~~	205	17	23.1	~~142.6~~	~~5354~~
6			5354	170	14	26.1	145.6	5354
	405	33.5	~~5355~~	201	17	16.5	~~160.1~~	~~5358~~
7			5358	218	15	15.5	159.1	5358
	320	26.4	~~5357~~	235	20	6.4	~~165.5~~	~~5359~~
8			5359	247	21	5.4	164.5	5359
	240	19.8	~~5358~~	247	21	-1.2	~~163.3~~	~~5359~~
9			5359	253	21	-1.2	163.3	5359
	160	13.2	~~5358~~	247	21	7.8	~~155.5~~	~~5357~~
10			5357	242	20	-6.8	156.5	5357
	85	7.0	~~5356~~	234	19	-12.0	~~144.5~~	~~5355~~
11			5355	231	18	-11.0	145.5	5355
	12	1.0	~~5350~~	191	15	-14.0	~~131.5~~	~~5351~~
12			5351	186	16	-15.0	130.5	5351
	0	0	~~5349~~	155	13	-13.0	~~117.5~~	~~5346~~
13			5348	149	12	-12.0	118.5	5348
	0	0	~~5345~~	119	10	-10.0	~~108.5~~	~~5346~~
14			5346	124	10	-10.0	108.5	5346

BY RAS DATE 1/7/80 **ROALD HAESTAD, INC.** SHEET NO 11 OF 55

CONSULTING ENGINEERS

CKD BY SH DATE 1/15/80 37 Brookside Road Waterbury, Conn. 06706 JOB NO 048-07

SUBJECT SEYMOUR NO. 3 - TEST FLOOD ½ PMF

DRAINAGE AREA = 432 ACRES = 0.68 Sq. mi.
= 0.54 (SEYMOUR NO 4) + 0.14 (SEYMOUR No 3)

FROM CORPS OF ENGINEERS CHART "ROLLING" TERRAIN

MPF = 2125 cfs/sq. mi. (2.0 Sq. mi. minimum)

PMF = 2125 x 0.14 sq. mi. = 298 cfs

½ PMF = ½ x 298 = 149 cfs

USE DEPTH OF RUNOFF = 19"/2 = 9.5"

VOLUME OF RUNOFF = 0.14 sq. mi. x 640 Ac./sq. mi. x 9.5"/12"/ft.

V = 71 Ac-Ft.

FROM DESIGN OF SMALL DAMS

$$q_p = \frac{484 A Q}{T_p} \qquad T_b = 2.67 T_p$$

q_p = PEAK RATE OF RUNOFF CFS
A = DRAINAGE AREA - Sq. mi.
Q = TOTAL RUNOFF - INCHES
T_p = TIME IN HOURS FROM START OF RISE TO PEAK
T_b = TIME BASE OF HYDROGRAPH IN HOURS

$$149 = \frac{484(0.14)(9.5)}{T_p}$$

T_p = 4.3 HOURS

T_b = 2.67 (4.3) = 11.5 HOURS

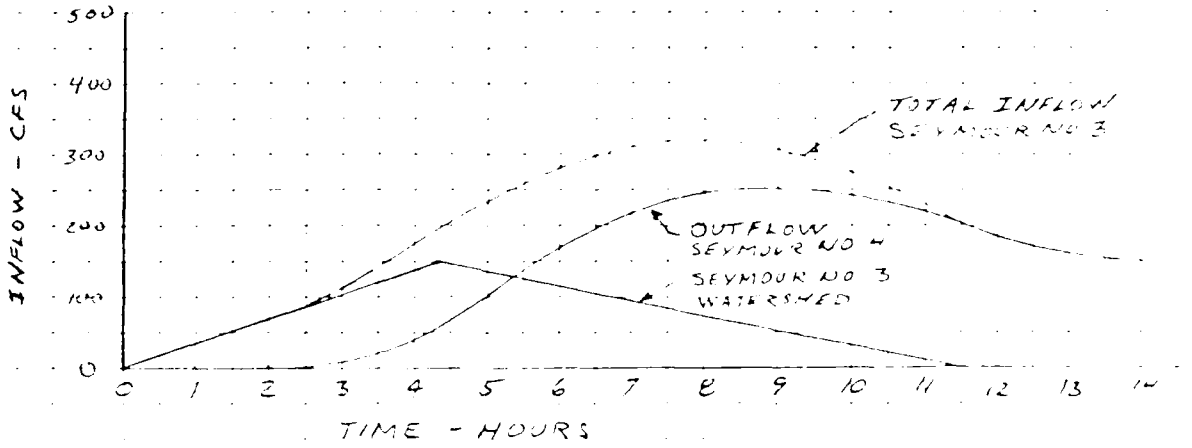
THE ABOVE HYDROGRAPH IS FOR SEYMOUR NO 3 WATERSHED. ROUTED OUTFLOW FROM SEYMOUR NO 4 MUST BE ADDED TO

BY ...D.K.S.... DATE ..1/12/80.. **ROALD HAESTAD, INC.** SHEET NO ...1... OF ...22...

CONSULTING ENGINEERS

CKD BY ..SH.. DATE ..1/15/80.. 37 Brookside Road Waterbury, Conn. 06708 JOB NO ...042-07...

SUBJECT ...SEYMOUR NO. 3 TEST FLOOD 1/4 PMF...



ROALD HAESTAD, INC.
CONSULTING ENGINEERS

BY SZ DATE 1/10/80 SHEET NO. 13
CHKD BY TAS DATE 1/ , 80 JOB NO. 049
SUBJECT SEYMOUR NO 3 - Flood Routing With Flashboard
½ PMF

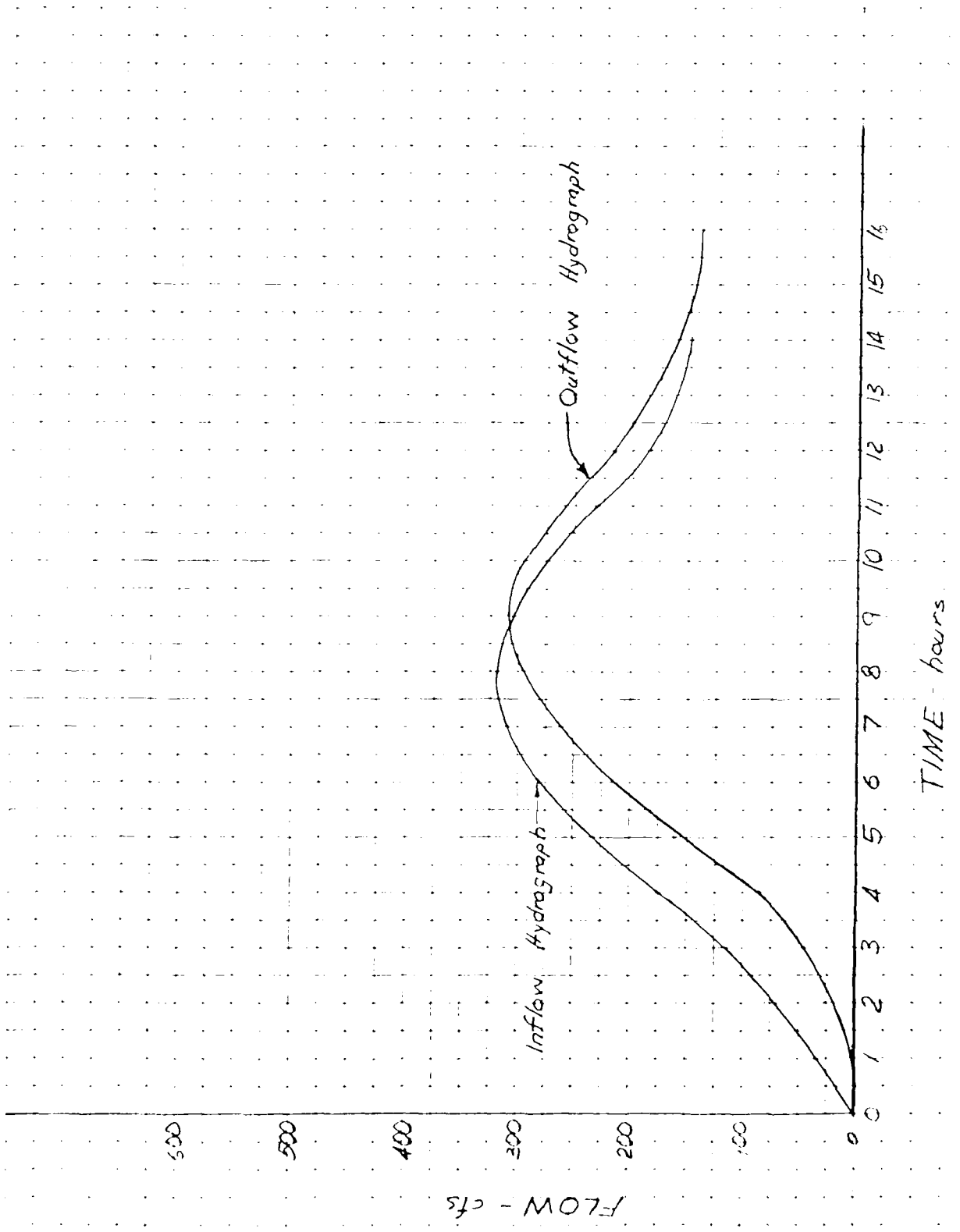
Time	Δt Hours	Average Rate of Inflow Q_i Δt Sec. Ft.	Average Inflow Acre-Feet	Trial Res. Storage El. End of Δt	Average Rate of Outflow Q_o Sec. Ft.	Average Outflow for Δt Acre-Feet	Incremental Storage, ΔS Acre-Feet	Total Storage Acre-Feet	Reservoir Elevation End of Δt
		0			0			0	
	1	18	1.5	~~453.3~~ 453.0	~~10~~ 0	~~1~~ 0	~~0.5~~ 1.5	~~0.5~~ 1.5	~~453.0~~ 453.1
2	1	53	4.4	453.4	13	1	3.4	4.9	453.4
3	1	93	7.8	453.7	35	3	4.8	9.7	453.7
4	1	145	12.0	454.2	65	5	7.0	16.7	454.2
5	1	205	17.0	454.8	123	10	7.0	23.7	454.8
6	1	258	21.5	455.2	188	16	5.5	29.2	455.2
7	1	295	24.6	455.5	238	20	4.6	33.8	455.5
8	1	315	26.3	455.7	278	23	3.3	37.1	455.7
9	1	313	26.1	455.8	303	25	1.1	38.2	455.8
10	1	288	24.0	455.7	303	25	-1.0	37.2	455.7
11	1	250	20.8	455.6	285	24	-3.2	34.0	455.5
	1	186	15.5	455.2	245	20	-4.5	29.5	455.2

BY SK DATE 1/14/80 **ROALD HAESTAD, INC.** SHEET NO 14 OF 23

CONSULTING ENGINEERS

CKD BY DHS DATE 1/21/80 37 Brookside Road Waterbury, Conn 06708 JOB NO 049-07

SUBJECT SEYMOUR NO. 3 - Flood Routing - 1/2 PMF



BY ...W.S.... DATE ..1/9/80.. **ROALD HAESTAD, INC.** SHEET NO ...15.... OF ...28...

CONSULTING ENGINEERS

CKD BY ..S.L. DATE ..1/15/80.. 37 Brookside Road - Waterbury, Conn. 06708 JOB NO ...045-08.....

SUBJECT ...SEYMOUR NO. 2 - TEST FLOOD 1/2 PMF.....

WATERSHED AREA - SEYMOUR NO. 2 ONLY = 0.48 sq. mi.

TOTAL WATERSHED = 1.15 sq. mi.

FROM CORPS OF ENGINEERS CHART FOR "ROLLING" TERRAIN

PMF = 2125 cfs/sq. mi. (Chart Minimum 2.0 sq. mi)

PMF = 2125 x 0.48 sq. mi. = 1020 cfs

1/2 PMF = 1/2 (1020) = 510 cfs

USE DEPTH OF RUNOFF = 19"/2 = 9.5"

Volume of Runoff = 0.48 sq. mi. (640 Ac/sq. mi.) x 9.5"/12"/ft.

Vol. = 243 Ac-Ft.

FROM DESIGN OF SMALL DAMS

$$q_p = \frac{484 A Q}{T_p} \qquad T_b = 2.67 T_p$$

q_p = PEAK RATE OF RUNOFF - CFS
A = DRAINAGE AREA - SQ-MI
Q = TOTAL RUNOFF - INCHES
T_p = TIME IN HOURS FROM START OF RISE TO PEAK
T_b = TIME BASE OF HYDROGRAPH IN HOURS

$$510 = \frac{484 (0.48)(9.5)}{T_p}$$

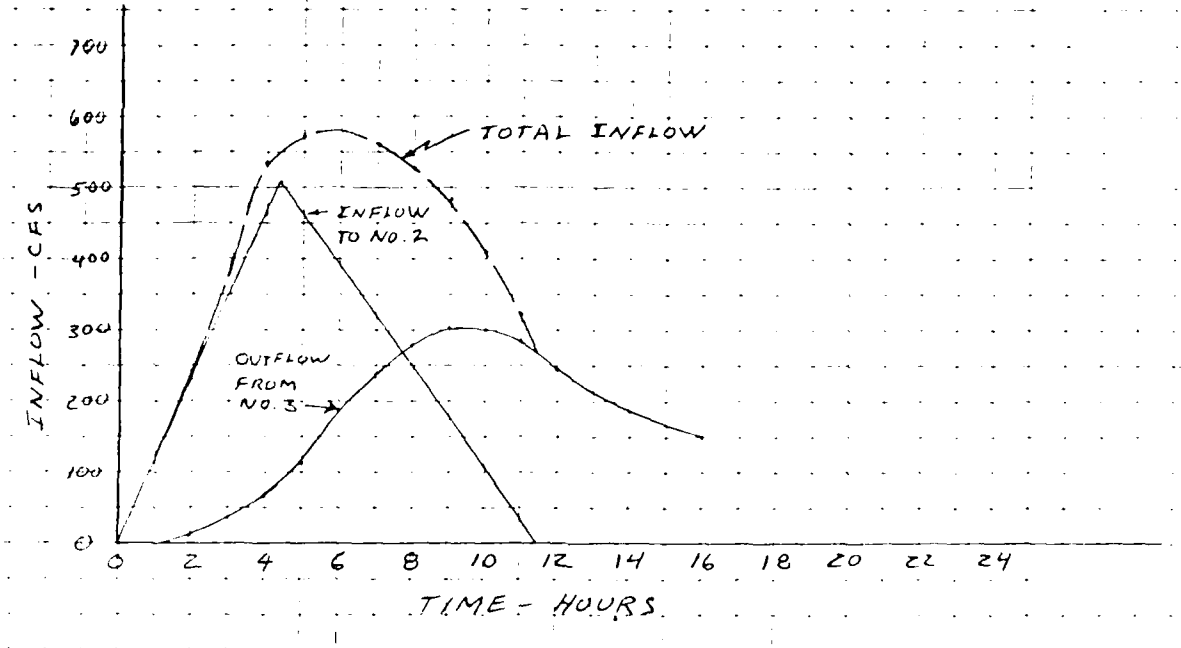
$T_p = 4.3$ HOURS

$T_b = 2.67 (4.3) = 11.5$ HOURS

THE ABOVE HYDROGRAPH IS FOR THE SEYMOUR NO. 2 WATERSHED. ROUTED OUTFLOW FROM SEYMOUR NO. 3 MUST BE ADDED TO GET TOTAL INFLOW.

SUBJECT SEYMOUR NO. 2 - TEST FLOOD ½ PMF

INFLOW - HYDROGRAPH



BY SL DATE 1/10/80 ROALD HALSTAD, INC. SHEET NO 17 OF 28
CHKD BY DLS DATE 1/21/80 CONSULTING ENGINEERS JOB NO 049-08
SUBJECT SEYMOUR DAM NO 2 - Flood Routing W/o Flashboards

TIME HOURS	ΔT HOURS	AVERAGE RATE OF INFLOW Q_i Δt SEC FT.	AVERAGE INFLOW ACRE-FEET	TRIAL RES. STORAGE EL. END OF Δt	AVERAGE RATE OF OUTFLOW Q_o SEC FT.	AVERAGE OUTFLOW FOR Δt ACRE-FEET	INCREMENTAL STORAGE, ΔS ACRE-FEET	TOTAL STORAGE ACRE-FEET	RESERVOIR ELEVATION END OF Δt
0		0			0			0	
1	1	63	5.3	3631	1	0	5.3	5.3	3631
2	1	188	15.7	3638	7	1	14.7	20.0	3638
3	1	325	27.1	3650	26	2	25.1	45.1	3649
4	1	468	39.0	~~3659~~	~~67~~	6	33.0	78.1	~~3663~~
				3663	90	8	31.0	76.1	3663
5	1	555	46.3	~~3669~~	~~180~~	15	31.3	107.4	~~3675~~
				3675	227	19	27.3	103.4	3674
6	1	575	47.9	~~3684~~	~~401~~	33	14.9	118.3	~~3681~~
				3681	361	30	17.9	121.3	3682
7	1	568	47.3	~~3688~~	~~489~~	41	6.3	127.6	~~3685~~
				3685	459	38	9.3	130.6	3686
8	1	545	45.4	~~3688~~	~~540~~	45	0.4	131.0	~~3686~~
				3686	519	43	2.4	133.0	3687
9	1	505	42.1	3687	539	45	-2.9	130.1	3686
10	1	445	37.1	~~3685~~	~~530~~	44	-6.9	123.2	~~3683~~
				3683	510	43	-5.9	124.2	3684
11	1	368	30.7	3681	439	37	-7.7	116.5	3680
12	1	285	23.8	~~3675~~	~~361~~	30	-6.2	110.3	~~3677~~
				3677	379	32	-8.2	108.3	3676
13	2	217	18.1	~~3675~~	~~332~~	28	-9.9	98.4	~~3672~~
				3672	303	26	-7.9	100.4	3673
14	2	169	14.1	~~3669~~	~~244~~	20	-5.9	94.5	~~3671~~
				3671	258	22	-7.9	92.5	3670
15									

BY SL DATE 1/14/80

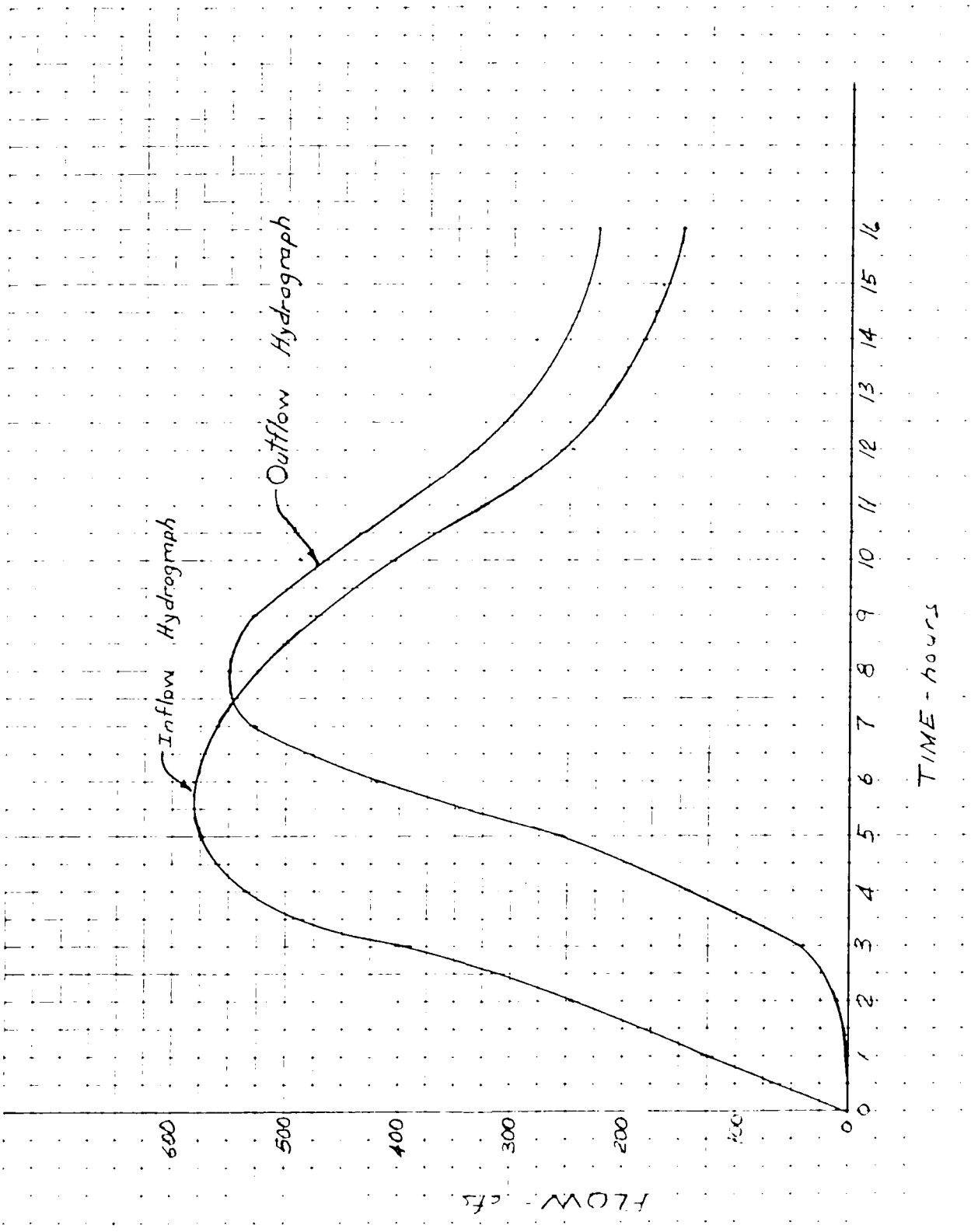
CKD BY DLS DATE 1/21/80

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
37 Brookside Road - Waterbury, Conn. 06708

SHEET NO 18 OF 28

JOB NO 047-08

SUBJECT SEYMOUR NO. 2 - Flood Routing



BY DLS DATE 1/10/80 **ROALD HAESTAD, INC.** SHEET NO 19 OF 28

CONSULTING ENGINEERS

CKD BY SL DATE 1/14/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-09

SUBJECT SEYMOUR NO. 1 - TEST FLOOD - ½ PMF

WATERSHED AREA - SEYMOUR NO. 1 ONLY = 0.22 Sq. Mi.

TOTAL WATERSHED = 1.4 Sq. Mi.

FROM CORPS OF ENG. CHART FOR "ROLLING" TERRAIN :

MPF = 2125 cfs/sq. mi. (Chart minimum 2.0 sq. mi.)

PMF = 2125 x 0.22 sq. mi. = 468 cfs

½ PMF = ½ (468) = 234 cfs

USE DEPTH OF RUNOFF = 19"/2 = 9.5"

VOLUME OF RUNOFF = 0.22 sq. mi. x 640 Ac/sq. mi. x 9.5"/12"/ft.

VOL = 111 Ac-Ft.

FROM DESIGN OF SMALL DAMS

$$q_p = \frac{484 A Q}{T_p} \qquad T_b = 2.67\ T_p$$

q_p = PEAK RATE OF RUNOFF - CFS
A = DRAINAGE AREA - Sq. Mi.
Q = TOTAL RUNOFF - INCHES
T_p = TIME IN HOURS FROM START OF RISE TO PEAK
T_b = TIME BASE OF HYDROGRAPH IN HOURS

$$234 = \frac{484 (0.22)(9.5)}{T_p}$$

T_p = 4.3 HOURS

T_b = 2.67 (4.3) = 11.5 HOURS

THE ABOVE HYDROGRAPH IS FOR SEYMOUR NO. 1 WATERSHED. ROUTED OUTFLOW FROM SEYMOUR NO. 2 MUST BE ADDED TO GET TOTAL INFLOW.

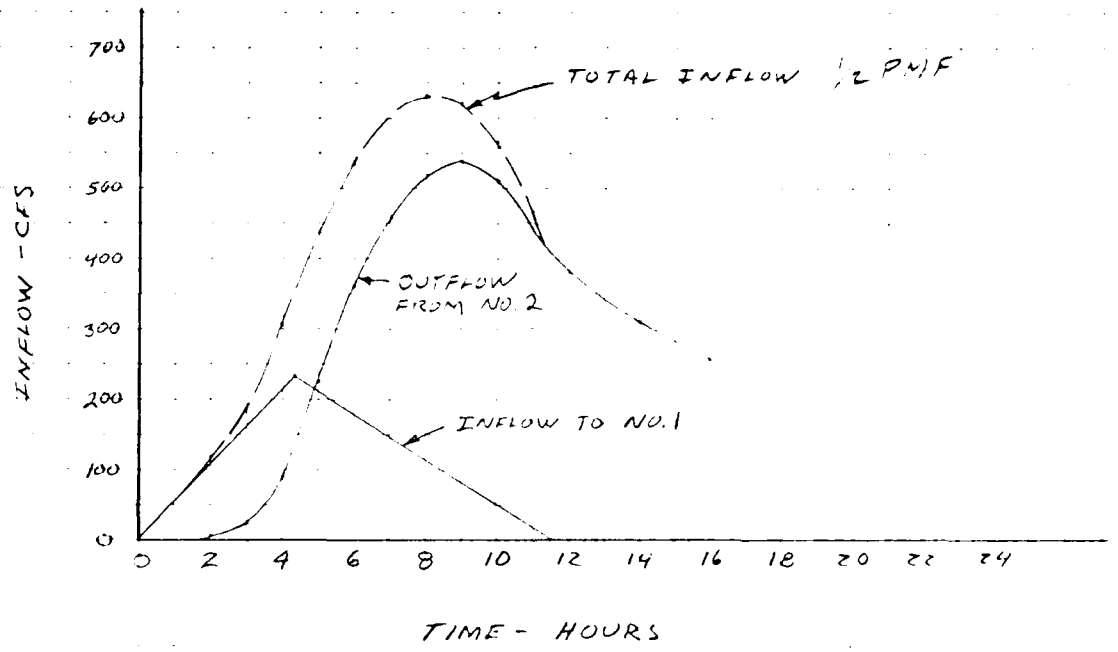
BY DLS DATE 1/10/80 **ROALD HAESTAD, INC.** SHEET NO 20 OF 28

CONSULTING ENGINEERS

CKD BY SL DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 079-09

SUBJECT SEYMOUR NO. 1 - TEST FLOOD ½ PMF

INFLOW HYDROGRAPH



BECAUSE OF THE SMALL SIZE OF SEYMOUR RESERVOIR NO. 1 INFLOW IS EQUAL TO OUTFLOW.

PEAK INFLOW - OUTFLOW = 625 CFS

SPILLWAY CAPACITY W/O FLASHBOARDS = 105 CFS

SPILLWAY CAPACITY = 17% of THE TEST FLOOD

BY ..... DATE 1/13/81 **ROALD HAESTAD, INC.** SHEET NO 21 OF 28

CONSULTING ENGINEERS

CKD BY DLS DATE 1/11/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO .....

SUBJECT REMOVE NO. 1 ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS

S = Reservoir Storage at time of failure = Storage at Spillway Level + Freeboard Storage

$$S = \left[12,636,536 \text{ gal} \times \frac{1 \text{ acre-feet}}{325,851 \text{ gals}}\right] + \left[5.1 \text{ acres} \times 2 \text{ ft}\right]$$

$S = 38.78 \text{ acre-ft} + 10.21 \text{ acre-ft}$

$S = 48.99 \text{ acre-ft}$ use 49 acre-ft

Q_{p1} = Peak Failure Outflow = $8/27\, W_b \sqrt{g}\, Y_o^{3/2}$

W_b = Breach Width = 40% of dam length across river at mid height = (0.4)(142) = 57 ft

Y_o = Total height from river bed to pool level at failure = 26 ft

$Q_{p1} = 8/27\,(57)\sqrt{32.2}\,(26)^{3/2} = 12,705$ cfs

SECTION NO. 1 (SEE FIGURE 5)

$H_1 = 10$ ft $(Area)_1 = 500$ sq ft

$V_1 = (Area)_1 \times Length$

$V_1 = [500 \text{ ft}^2 \times 1550 \text{ ft}] \times \frac{1 \text{ acre-ft}}{43,560 \text{ ft}^3} = 17.79$ acre-ft use 18 acre-ft

V_1 is less than 1/2 of S ∴ reach NO1 is ok

$Q_{p2}\,(TRIAL) = Q_{p1}\,(1 - \frac{V_1}{S})$

$Q_{p2}\,(TRIAL) = 12,705 \text{ cfs}\,(1 - \frac{18}{49})$

$Q_{p2}\,(TRIAL) = 8038$ cfs

$H_2 = 8.7$ ft $(Area)_2 = 380$ sq ft

$V_2 = (Area)_2 \times Length$

$V_2 = [380 \text{ ft}^2 \times 1550 \text{ ft}] \times$ [illegible] = [illegible]

Continued:

$$V_{ave} = \frac{V_1 + V_2}{2} = \frac{18 + 14}{2} = 16 \text{ acre-ft}$$

$$Q_{P2} = Q_{P1}\left(1 - \frac{V_{ave}}{S}\right)$$

$$Q_{P2} = 12{,}705 \text{ cfs}\left(1 - \frac{16}{47}\right)$$

$$Q_{P2} = 8{,}556 \text{ cfs} \qquad H_2 = 8.5 \text{ ft}$$

SECTION NO 2: Reach Length = 1050 ft

$Q_{P2} = 8{,}556$ cfs

$H_2 = 9.3$ ft $\qquad (Area)_2 = 550$ sq ft

$V_2 = (Area)_2 \times Length$

$$V_2 = [550 \text{ ft}^2 \times 1{,}050 \text{ ft}] \times \frac{1 \text{ acre-ft}}{43{,}560 \text{ ft}^3} = 13.25 \text{ use } 13 \text{ acre-ft}$$

V_2 is less than ½ of S ∴ reach NO 2 is ok.

$$Q_{P3}(TRIAL) = Q_{P2}\left(1 - \frac{V_2}{S}\right)$$

$$Q_{P3}(TRIAL) = 8{,}556 \text{ cfs}\left(1 - \frac{13}{47}\right)$$

$Q_{P3}(TRIAL) = 6{,}286$ cfs

$H_3 = 8.5$ ft $\qquad (Area)_3 = 450$ sq ft

$V_3 = (Area)_3 \times Length$

$$V_3 = [450 \text{ ft}^2 \times 1{,}050 \text{ ft}] \times \frac{1 \text{ acre-ft}}{43{,}560 \text{ ft}^3} = 10.85 \text{ use } 11 \text{ acre-ft}$$

$$V_{ave} = \frac{V_3 + V_2}{2} = \frac{13 + 11}{2} = 12 \text{ acre-ft}$$

$$Q_{P3} = Q_{P2}\left(1 - \frac{V_{ave}}{S}\right)$$

$$Q_{P3} = 8{,}556 \text{ cfs}\left(1 - \frac{12}{47}\right) = 6{,}460 \text{ cfs} \qquad H_3 = 8.5 \text{ ft}$$

SECTION NO 3: Reach Length - 1,580 ft

$Q_{P3} = 6,460$ cfs

$H_3 = 6.5$ ft $\quad (Area)_3 = 500$ sq ft

$V_3 = (Area)_3 \times Length$

$V_3 = \left[500 ft^2 \times 1,580 ft\right] \times \frac{1 acre-ft}{43,560 ft^2} = 18.1$ use 18 acre-ft

V_3 is less than 1/2 of S[illegible] reach NO. 3 is [illegible]

$Q_{P4}(TRIAL) = Q_{P3}\left(1 - \frac{V_3}{S}\right)$

$Q_{P4}(TRIAL) = 6,460 cfs \left(1 - \frac{18}{41}\right)$

$Q_{P4}(TRIAL) = 4,037$ cfs

$H_4 = 4.0$ ft $\quad (Area)_4 = 320$ [illegible] ft

$V_4 = (Area)_4 \times Length$

$V_4 = \left[320 ft^2 \times 1,580 ft\right] \times$ [illegible] $= 11.6$ Ac-Ft.

$V_{ave} = \frac{V_4 + V_3}{2} = \frac{12 + 18}{2} = 15$ acre-ft

$Q_{P4} = Q_{P3}\left(1 - \frac{V_{ave}}{S}\right)$

$Q_{P4} = 6,460 cfs \left(1 - \frac{15}{44}\right)$

$Q_{P4} = 4,482$ cfs

$H_4 = 4.5$ ft

SECTION NO 4: Reach Length = 1,300 ft

$Q_{P4} = 4,482$ cfs

$H_4 = 7.0$ ft $\quad (Area)_4 = 400$ sq ft

$V_4 = (Area)_4 \times Length$

$V_4 = \left[400\ ft^2 \times 1,300\ ft\right] \times \frac{1\ acre-ft}{43,560\ ft^3} = 11.9$ use 12 acre-ft

V_4 is less than 1/2 of S .. reach is O.K.

$Q_{P5}(TRIAL) = Q_{P4}(1 - V_4/S)$

$Q_{P5}(TRIAL) = 4,482 cfs (1 - 12/47)$

$Q_{P5}(TRIAL) = 3,384$ cfs

$H_5 = 6.2$ ft $\quad (Area)_5 = 290$ sq ft

$V_5 = (Area)_5 \times Length$

$V_5 = \left[290\ ft^2 \times 1,300\ ft\right] \times \frac{1\ acre-ft}{43,560\ ft^3} = 8.65$ use 9 acre-ft

$V_{ave} = \frac{V_5 + V_4}{2} = \frac{9 + 12}{2} = 10.5$ acre-ft

$Q_{P5} = Q_{P4}(1 - V_{ave}/S)$

$Q_{P5} = 4,482 cfs (1 - 10.5/47)$

$Q_{P5} = 3,522$ cfs

$H_5 = 6.4$ Feet

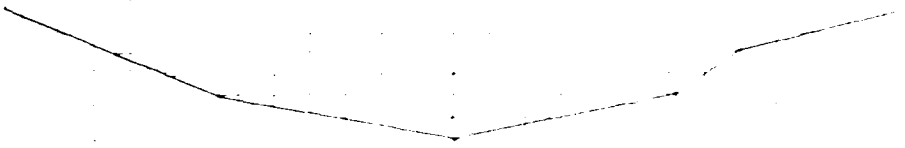
BY ...RLS.... DATE 1/10/80 **ROALD HAESTAD, INC.**

CKD BY SL DATE 1/14/80

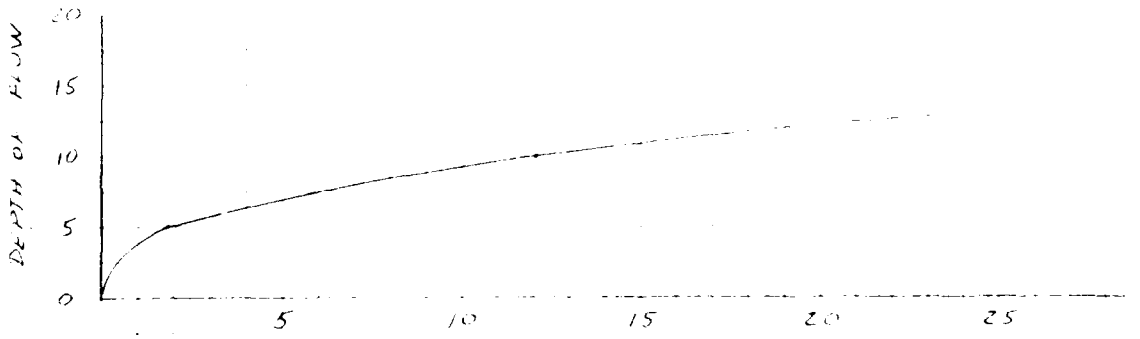
SUBJECT SEYMOUR NO. 1 FLOW ROUTING

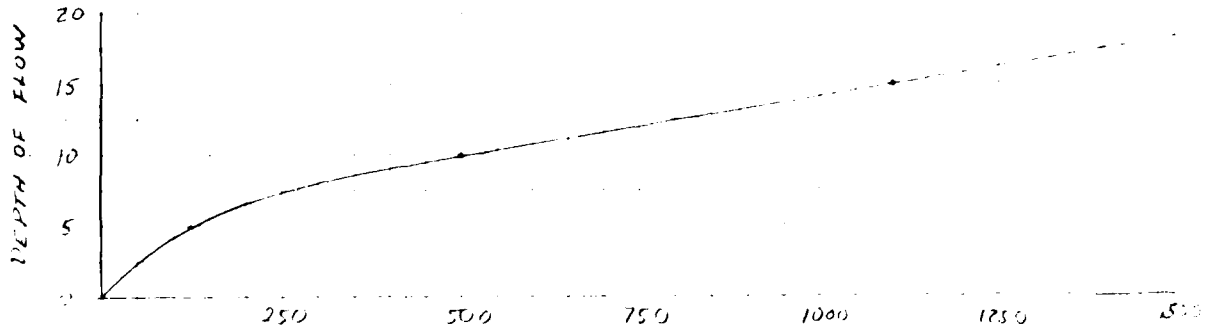
SECTION NO. 1 (SEE FIGURE NO 5)

SCALE: 1"=40'
LENGTH = 1550'
n = 0.015
S = 7.7%



D	W_p	A	R	S	V	Q
5	50	125	2.50	0.077	15.2	1900
10	100	500	5.00	0.077	24.1	12,063
15	122	1100	9.02	0.077	35.7	3,270
20	144	1700	11.81	0.077	42.8	72,750





BY DLS DATE 1/10/80

CKD BY SH DATE 1/14/80

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
37 Brookside Road - Waterbury, Conn. 06708

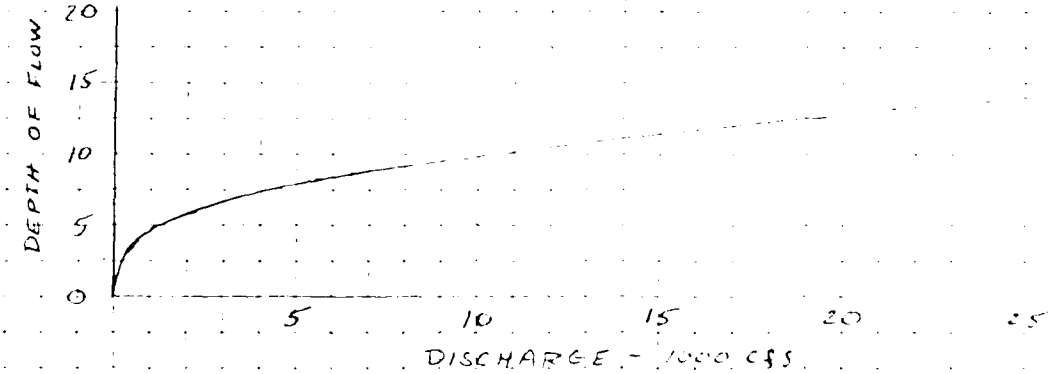
JOB NO 049

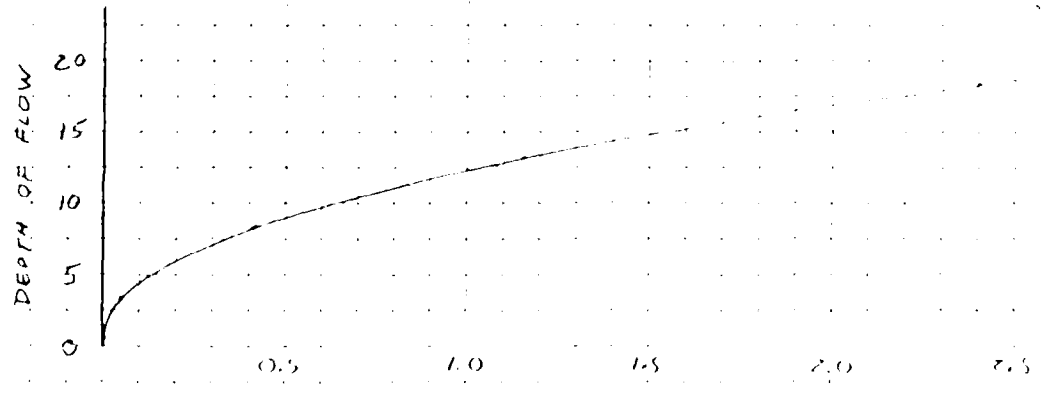
SUBJECT SEYMOUR NO 1 - FLOOD ROUTING

SECTION NO 2

SCALE 1" = 200'

D	W	A	R	S	V	Q
3	40	53	1.33	0.027	7.4	392
8	130	416	3.20	0.027	13.3	5533
13	225	1166	5.18	0.027	18.3	21,338
18	335	2404	7.18	0.027	22.7	54,571
23	835	5529	6.62	0.027	21.5	118,874





AD-A143 838 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS SEYMOUR RESERVOIR NUM..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV FEB 80 2/2

UNCLASSIFIED F/G 13/13 NL

END
DATE FILMED
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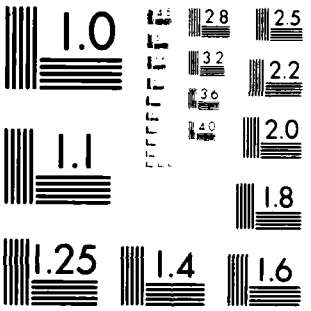
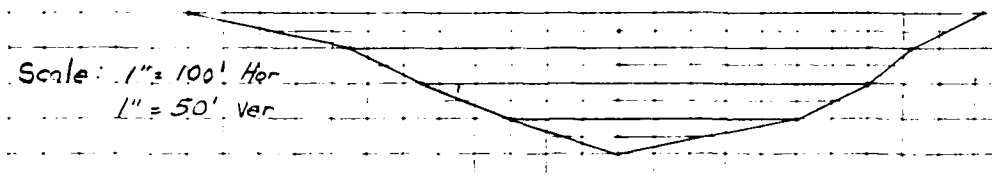


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

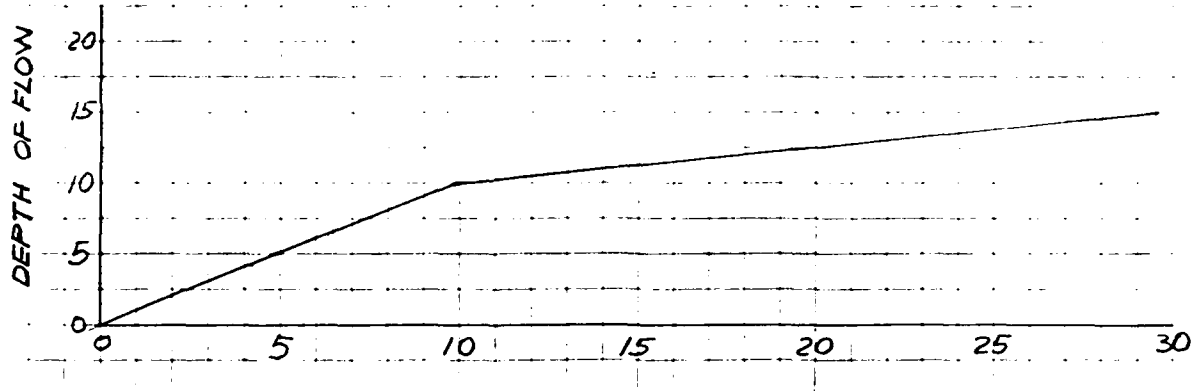
SUBJECT SEYMOUR NO 1 - FLOOD ROUTING

SECTION NO 3 (SEE FIGURE NO 5)

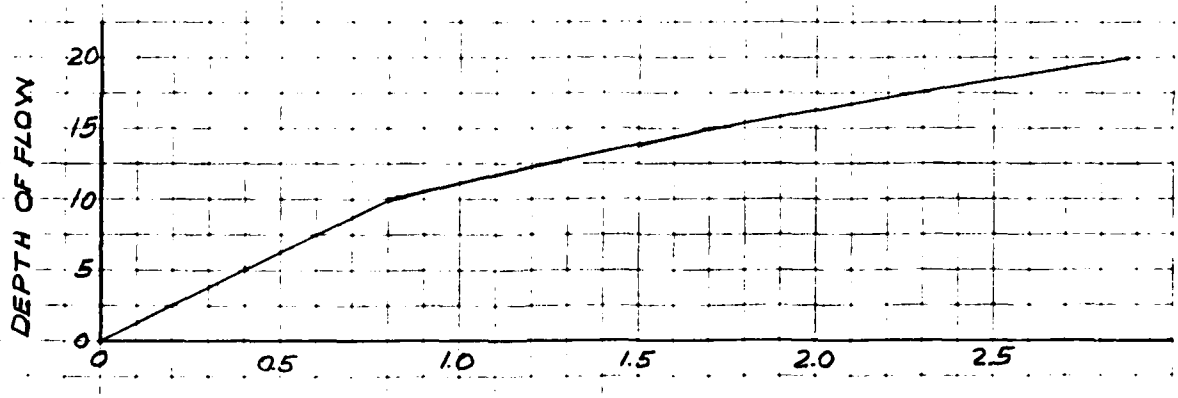


n = 0.04
L = 1,580 ft
S = 0.014

D	Wp	A	R	S	V	Q
5	85	400	4.70	0.014	12.4	4,960
10	170	800	4.70	0.014	12.4	9,920
15	225	1725	7.67	0.014	17.1	29,498
20	270	2875	10.65	0.014	21.3	61,238



DISCHARGE - 1000 cfs



AREA - 1000 sq ft

BY DLS DATE 1/2/80 **ROALD HAESTAD, INC.** SHEET NO 28 OF 28

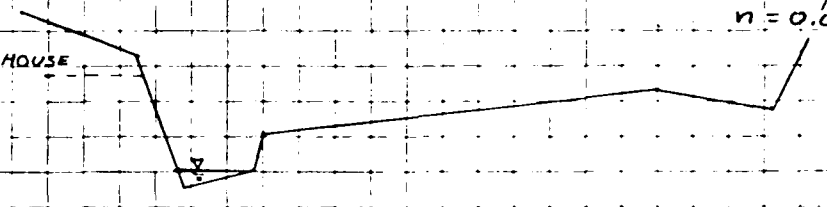
CONSULTING ENGINEERS

CKD BY SL DATE 1/14/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-09

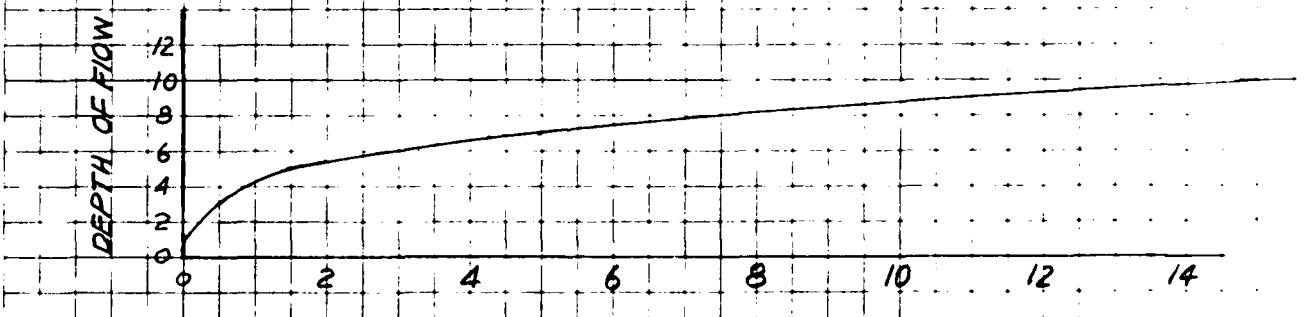
SUBJECT SEYMOUR NO. 1 FLOOD ROUTING

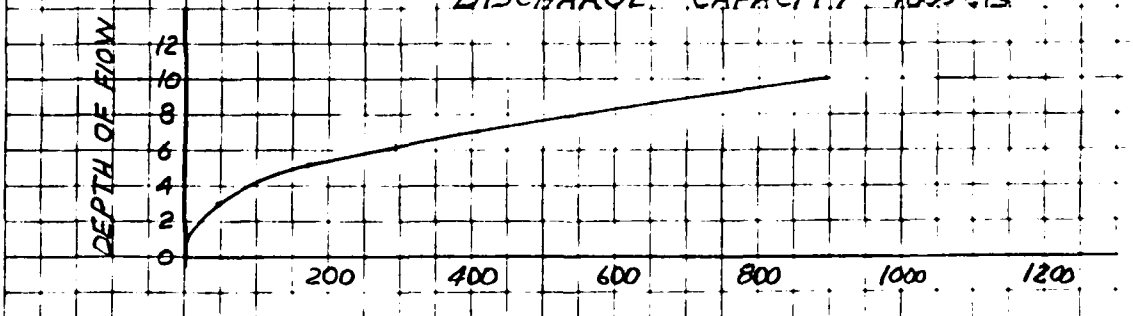
SECTION NO. 4 (FIELD SURVEYED)

SCALE 1" = 40' HORZ.
1" = 10' VERT.
S = 0.027
L = 1,300 ft
n = 0.04



D	W_p	A	R	S	V	Q
1	18	9	0.50	0.027	3.9	35
3	23	49	2.13	0.027	10.1	495
5	100	169	1.69	0.027	8.7	1,470
7	150	411	2.74	0.027	12.0	4,932
10	190	897	4.72	0.027	17.2	15,428





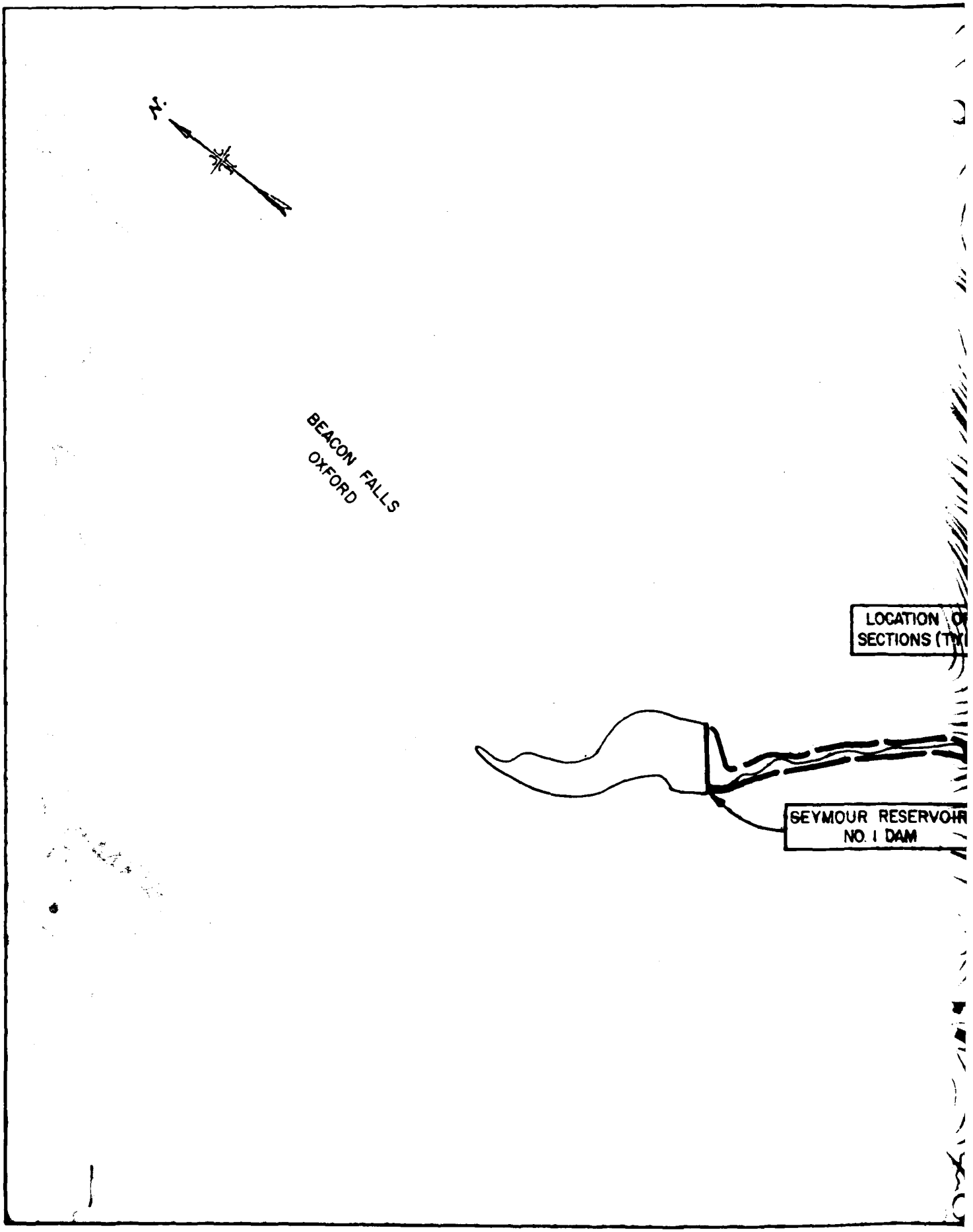
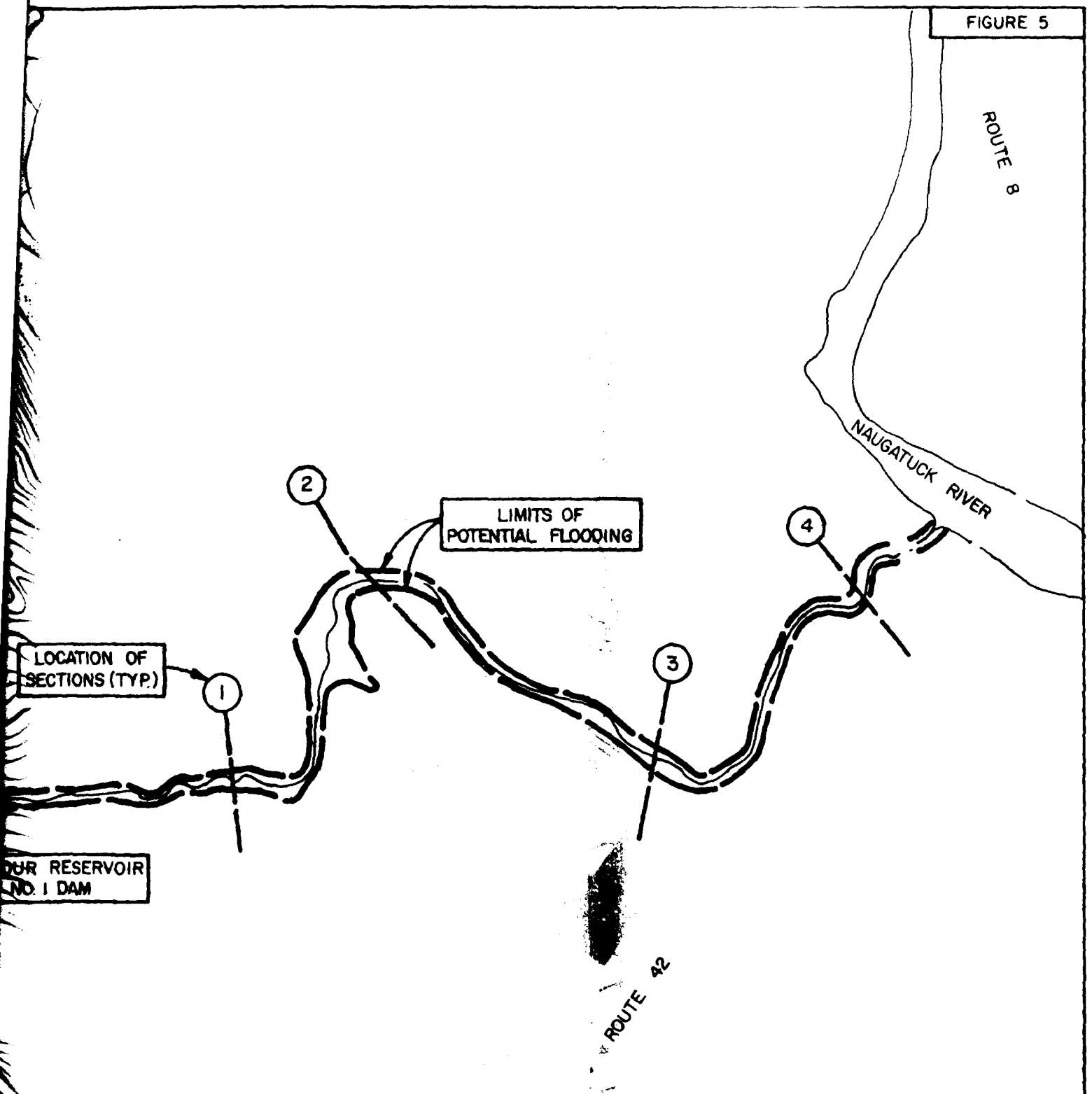

N
BEACON FALLS
OXFORD
LOCATION OF
SECTIONS (TYP.)
SEYMOUR RESERVOIR
NO. 1 DAM

FIGURE 5



ROALD HAESTAD, INC CONSULTING ENGINEERS WATERBURY CONNECTICUT	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

LIMITS OF POTENTIAL FLOODING

SEYMOUR RESERVOIR NO. 1 DAM

BEACON FALLS, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES 1"=500'
RJS	DLS		DATE FEB 1980 PLATE D-30

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME